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VARIABLES AFFECTING RADIATION-INDUCED PERFORMANCE DECREMENTS.(U)
APR 77 G C BROWN, M G YOCHMOWITZ, R P PATRICK

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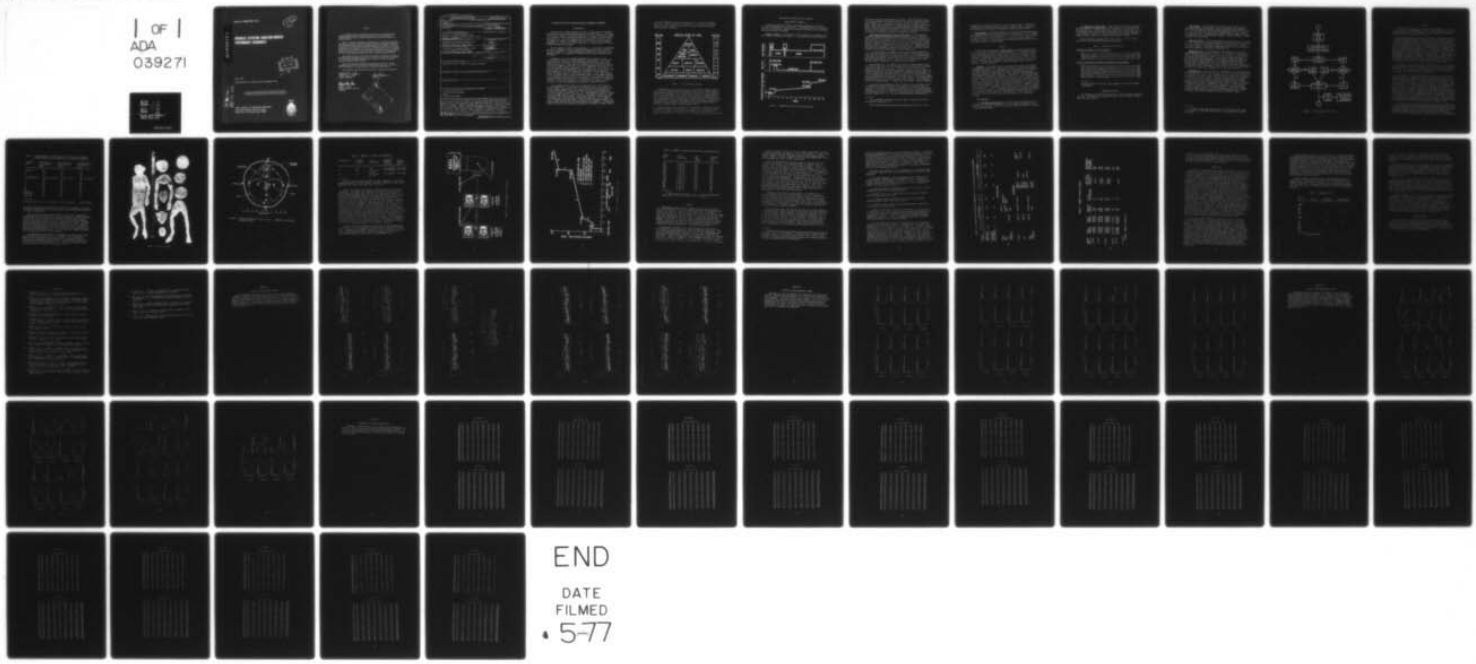

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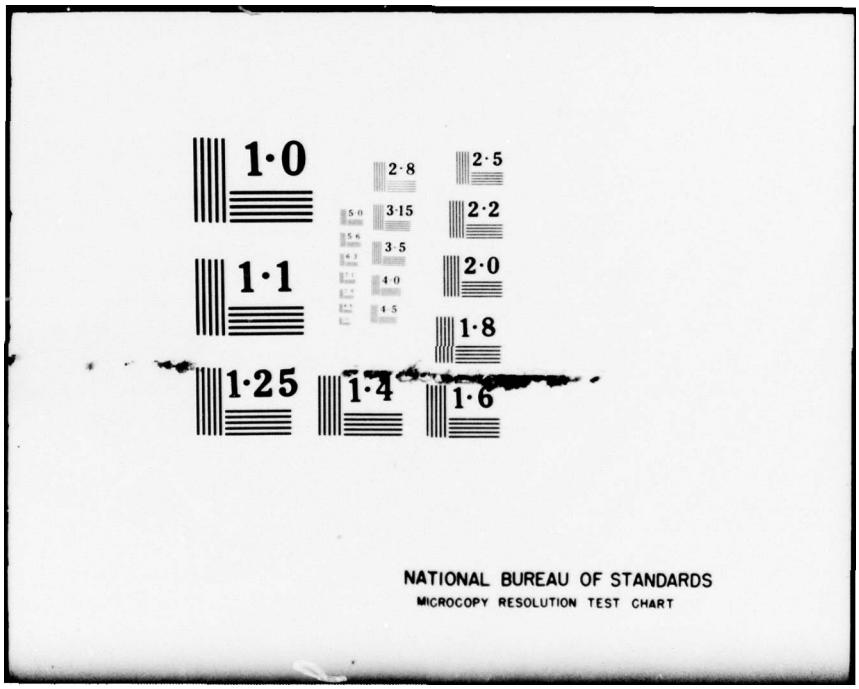
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Report SAM-TR-77-3

VARIABLES AFFECTING RADIATION-INDUCED PERFORMANCE DECREMENTS

April 1977

Interim Report for Period June 1975-August 1976

Approved for public release; distribution unlimited.

USAF SCHOOL OF AEROSPACE MEDICINE
Aerospace Medical Division (AFSC)
Brooks Air Force Base, Texas 78235

NOTICES

This interim report was submitted by personnel of the Weapons Effects Branch, Radiation Sciences Division, USAF School of Aerospace Medicine, Aerospace Medical Division, AFSC, Brooks Air Force Base, Texas, under job order 7757-05-22.

When U.S. Government drawings, specifications, or other data are used for any purpose other than a definitely related Government procurement operation, the Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

The animals involved in this study were procured, maintained, and used in accordance with the Animal Welfare Act of 1970 and the "Guide for the Care and Use of Laboratory Animals" prepared by the Institute of Laboratory Animal Resources--National Research Council.

This report has been reviewed by the Information Office (OI) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

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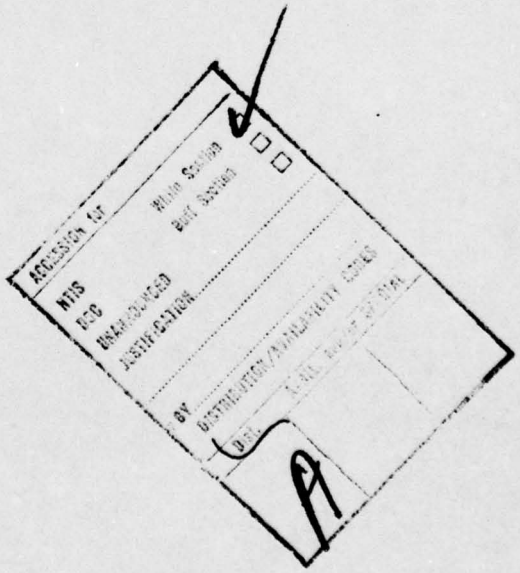

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A discrete behavioral task was initiated to study the effects of a 300-rad variable dose rate protracted-exposure profile upon positively (food reward) and negatively (shock) reinforced groups of primates. Subjects performed the task for 12 hours. Among the 8 shock and 7 food subjects, effects noted were performance decrements in 2 shock and 2 food subjects, delayed reaction-times in 3 shock and 3 food subjects, and emesis in 1 shock and 4 food subjects. Such information is important to military planners who need accurate nuclear vulnerability and survivability assessments for aircrew.

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VARIABLES AFFECTING RADIATION-INDUCED PERFORMANCE DECREMENTS

INTRODUCTION

In the event of armed conflict, Air Force systems may be subjected to environments resulting from the detonations of nuclear weapons. The capability of such systems to withstand exposure to these environments, without loss of their mission completion capabilities, is termed "systems nuclear survivability." Air Force Regulation 80-38, Management of the Air Force Survivability Program, 6 September 1973, and Air Force Systems Command Supplement 1, 12 July 1974, establish policy for conducting the Air Force nuclear survivability program.

Of the numerous systems in the inventory or in development, the manned aircraft is germane to crew survivability/vulnerability (S/V) analysis. The crew represents a vital and potentially susceptible subsystem of the manned aircraft, so a complete S/V analysis must include consideration of the crew.

Detonation of nuclear weapons generates blast, thermal, X-ray, electromagnetic pulse, and nuclear-radiation environments. The aircraft itself provides protection to the crew from the blast environment and thermal curtains or shields with PLZT flashblindness/retinal burn protective window segments can be used to isolate crewmembers relatively easily from the external thermal environment (3). Baum et al. (2) recently reported that the electromagnetic pulse environment has little or no effect upon crewmembers even after exposure to 10^8 pulses of electromagnetic energy with amplitudes of 447,000 volts per meter. In the lower reaches of the atmosphere, which is the operational regime of most manned systems, X-rays produced during detonation are absorbed by the atmospheric gases in relatively short distances and are of limited concern in crew S/V analysis. Therefore, of the many components of the nuclear environment, nuclear radiation is the most significant contributor to crew S/V effects.

The Aerospace Medical Division (in particular, the USAF School of Aerospace Medicine) is responsible for providing support and guidance to field commands, laboratories, and program offices on human operator performance and biomedical aspects of system survivability/vulnerability. In initial studies, Pickering et al. (13) investigated the effects of high-dose-rate gamma radiation on the behavior, physiology, biochemistry, and pathology of the rhesus monkey. The present approach involves extensive system-modeling techniques which include the human as a vital element. Data are obtained from experiments using trained infrahuman primates (the rhesus monkey) performing in nuclear radiation environments. Interspecies models are then used to generate extrapolative estimates of human response

to nuclear radiation, by dose and time (Fig. 1), based on the monkey data (14). These estimates are incorporated into system-level models which are used to predict the effects of nuclear radiation upon the manned system's performance.

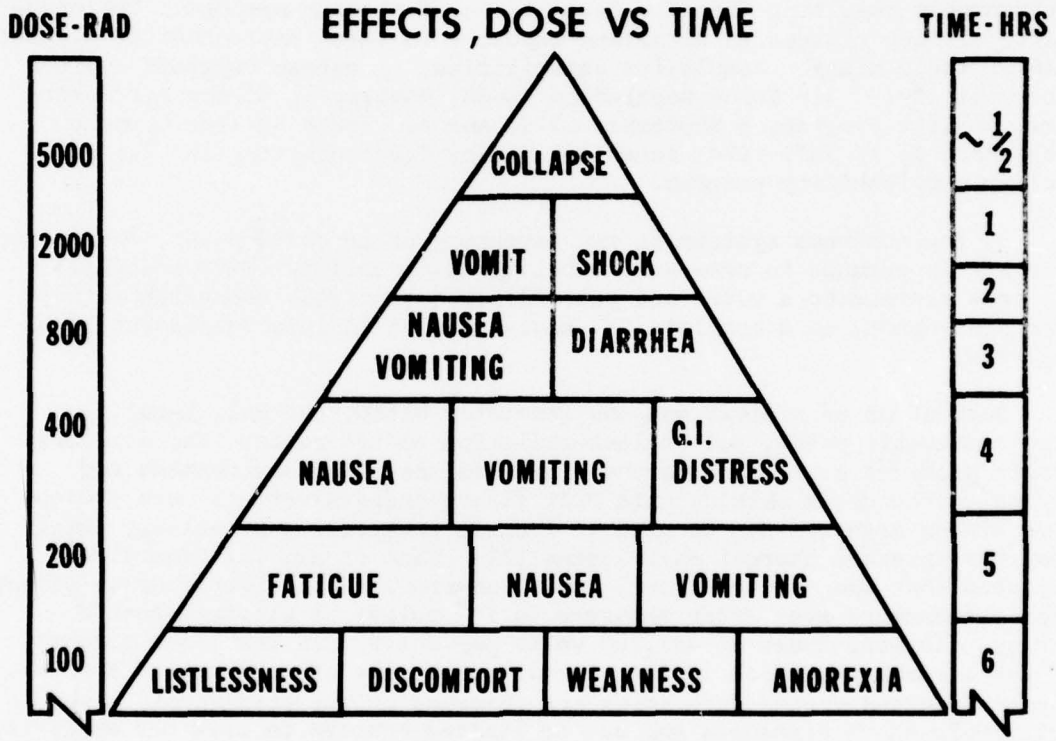

Figure 1. The prodromal syndrome.

Experimentally, the major objective is to obtain information on the emetic behavior and performance degradation exhibited by rhesus monkeys in a protracted low-dose-rate nuclear radiation environment. Also, emetic behavior and performance are compared between groups of animals with different levels and types of motivation while subjected to both identical work requirements and ionizing-radiation exposure profiles (rate and dose). The emesis data are compiled and combined with other data to support the development of an analytical model that can be used to predict emetic behavior of rhesus monkeys (and ultimately humans).

The task used in this experiment is a relatively simple one in which the animal responds to a stimulus, i.e., depressing a lever when a red cue light is illuminated. Discrete aircrew tasks (e.g., activating fire-suppression subsystems in response to a fire-warning light) would be similar.

EXPERIMENTAL METHODOLOGY AND EQUIPMENT

Experimental Parameters

To achieve similarity between experimental parameters and actual operational parameters of an aircraft on a strategic mission, the mission scenario, ionizing-dose accumulation during the mission, and crew workload were realistically integrated.

Mission Scenario -- A hypothetical mission profile of a manned strategic bomber is presented in Figure 2. The takeoff and climbout phase of

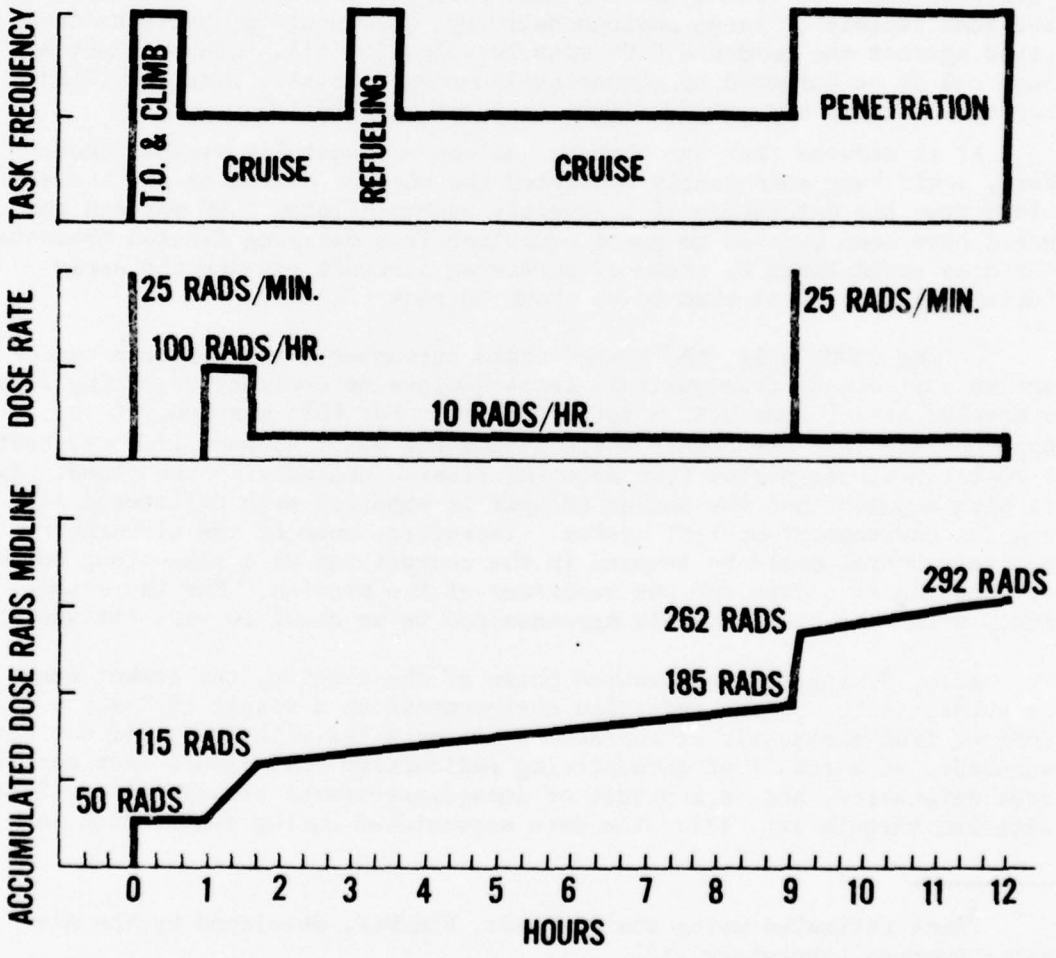

Figure 2. Hypothetical mission and dose profiles.

the mission requires approximately 30 minutes. The bomber then cruises at optimum altitude and speed to conserve fuel during continental United States (CONUS) exit. At 3 hours into the mission, the bomber refuels from a tanker for approximately 30 minutes and then resumes cruise status. About 9 hours into the mission, the bomber descends to approximately 500-ft altitude and begins penetration of hostile territory. The point at which the last weapon is delivered on target is defined as the end of the nuclear S/V mission and occurs 12 hours after takeoff.

Ionizing-Dose Accumulations During the Mission -- To formulate a reasonable hypothesis for the spectra of ionizing radiation which the bomber crew could encounter during the hypothetical mission scenario, we must postulate nuclear threats to the bomber. Because intercontinental ballistic missiles (ICBM) are the most accurate of enemy missile systems and most capable of large payload delivery, they would probably be targeted against the hardened U.S. missile silos (9, 16). Bomber bases are most apt to be targeted by submarine-launched ballistic missiles (SLBM) because of their more rapid flight to their targets (9).

It is assumed that our bombers, having successfully escaped their base, could have momentarily contacted the edge of a minutes-old nuclear cloud from the detonation of a several-hundred-kiloton SLBM warhead and would have been exposed to gamma radiation from decaying fission products.[a] The dose accumulated by crews of surviving aircraft grazing the early nuclear cloud is estimated to be about 50 rads (tissue).

During CONUS exit, the bomber could encounter other airborne radioactive dust clouds from multiple megaton-class detonations resulting from a massive attack upon U.S. missile fields.[b] For this mission, it is hypothesized that the bomber would accumulate about 65 rads (tissue) over a 20- to 30-minute period from decaying fission products in the cloud. It is also assumed that the bomber cockpit is supplied with unfiltered air via its environment-control system. Therefore, some of the airborne radioactive material could be trapped in the cockpit and be a take-along source of crew ionizing dose for the remainder of the mission. For the experiment, this take-along dose is hypothesized to be about 10 rads (tissue)/hr.

Also, during the penetration phase of the mission, the bomber could be subjected to nuclear radiation environments as a result of hostile actions from air-to-air or surface-to-air missiles with low-yield nuclear warheads, as a result of encountering radioactive dust clouds from collateral detonation, and as a result of damage-assessment surveys of previously attacked targets (11, 12). The dose accumulated during penetration is

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[a] Dose estimated using the new code, FIREFLY, developed by the Air Force Weapons Laboratory (10).

[b] Dose estimated using techniques presented by Patrick et al. (11).

assumed to be a 3-minute exposure of about 75 rads (tissue). The above considerations resulted in the ionizing-dose profile (Fig. 2) used in the experiment and is not meant to replicate any specific manned system.

Crew Workload -- The various states of crew activity during different mission phases were simulated by varying the task frequency. During takeoff and climbout, refueling, and penetration, the frequency of stimulus presentation was twice that during cruise. This variation in task frequency, depicted in Figure 2, simulates increased workload generally experienced by crews during critical mission phases.

Subjects

Fifteen male rhesus monkeys (Macaca mulatta), weighing between 2.95 and 4.32 kg, were randomly selected and divided into two groups trained to press a lever when a visual stimulus (a red light) was presented. Seven animals were reinforced with a food pellet (S+ group) upon each correct response. (These food subjects were fed on nontest days in order to maintain approximately 90% of original body weight plus a small allowance for growth.) The remaining 8 animals (S- group) received a mild shock for failure to respond correctly.

Training -- Each subject was trained individually until performance on the task was sufficiently stable for training to continue by automated programming equipment (7). Each subject was then placed in the training unit each work day for approximately 1 hour. Training sessions were gradually lengthened to duplicate the exact schedule to be exercised during final baseline and exposure conditions. (See Fig. 2.) The final performance profiles included four consecutive sessions: session 1 lasted 3 hours; sessions 2 and 3 lasted 2 hours 40 minutes; and session 4 lasted 3 hours 40 minutes. There was a 20-minute rest period between sessions. The stimulus presentation frequency of each session was not constant. In sessions 1 and 2, an average 20-minute interval consisted of 37 stimuli; whereas a similar interval in session 3 averaged 30 presentations, and in session 4 averaged 60 presentations. Session 1 simulated the takeoff, climb, and cruise phases of the profile; session 2, the refueling and cruise activities; and session 3, the low-level cruise activity. The greatest activity rates were in session 4--to coincide with the penetration phase of the hypothetical mission.

Diet Control:

(a) Avoidance (Shock) Group -- Four percent of body weight was calculated, and the animals were fed 1/3 of this amount for each of three daily feeding periods. The last daily portion was replaced with 1/2 apple on Tuesday and Thursday.

(b) Appetitive (Food) Group -- These subjects were fed only during task performance for working days with the exception of their receiving 1/2 apple per week. Variable amounts of monkey chow were available to these subjects on nonworking days. Body weight was monitored each day to insure adequate nutrition and was maintained to approximately 85%–90% of prestudy weight, except for a small projected growth increase.

Feeding and work schedules are listed in Table 1. Diet: Purina Monkey Chow, 5-gm nonmedicated biscuits, and apples.

TABLE 1. FEEDING AND WORK SCHEDULE

Schedule for subjects in holding cages:

Lights on	0700
Feed shock subjects	0720, 1200, 1600
Feed food subjects	0720, 1200, 1600[a]
Lights off	1800

Baseline and exposure schedule for subjects on testing days:

Lights on	0700
Feed (shock subjects only) not later than	0720
Move subjects for testing	0745
Subjects in position to begin testing session	0800
Start baseline/exposure session	0800
End session	2100
Return subjects to holding cage	2200

[a]Variable amounts of food to insure adequate nutrition and weight maintenance.

Equipment and Tasks

The apparatus consisted of a panel with a single lever and associated cue light. The subject was required to press the lever within 1 second after the light came on.

BRS Program -- The experiment was controlled by Tech Serv Inc.'s Behavioral Research Systems (BRS) solid state modules which randomly activated the stimulus according to mean presentation rates (VI_1 = 20 sec, VI_2 = 40 sec).[c] BRS logic also controlled the duration of the stimulus and the presentation or withholding of food and shock rewards. Data were accumulated on and recorded from BRS counters. Figure 3 contains a flow diagram of this BRS system.

Emesis Recording -- The entire radiation-exposure period was recorded on video tape so that the emetic episodes were available for later quantification. An emetic episode was defined as a series of three or more reflexive movements consisting of coordinated mouth opening, opisthotonos, and maximal abdominal musculature contraction (5).

Appetitive Task — Food availability was signaled on a dual-rate variable-interval schedule (VI_1 = 20 sec, VI_2 = 40 sec)[c] by the presentation of the cue light, which remained lit for 1 second. If the subject pressed the lever within this time, a 97-mg Noyes banana-flavored food pellet was delivered immediately. If the subject failed to respond, he did not receive a pellet and had to wait until the next presentation of the cue light. Pressing the lever in the absence of the cue light resulted in a 25-second period in which scheduled lights were suppressed. In 20-minute periods, data were recorded in the form of (a) food-reinforced responses, (b) failures to respond, and (c) response latencies.

Avoidance Task — The cue light was presented on a similar dual-rate variable-interval schedule (VI_1 = 20 sec, VI_2 = 40 sec) with a limited hold of 1 second. The subject could terminate the cue light and avoid a shock by pressing the response lever, in which case the response was recorded as a successful avoidance response. Failure to respond within 1 second resulted in a 0.2-second shock administered through foot shock plates. Response latencies were accumulated for each 20-minute epoch, and failures to respond were recorded. Responding in the absence of the cue light resulted in an immediate shock (0.1-sec duration). Shock level was assessed for each subject to be mildly aversive in sustaining avoidance responding under normal daily conditions (approximately 4 mA). Shock levels did not disrupt performance and did not harm the animals.

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[c] VI_1 presentation range was once per 5 to 35 seconds, with a mean of 20 seconds; VI_2 range was once per 10 to 70 seconds, with a mean of 40 seconds.

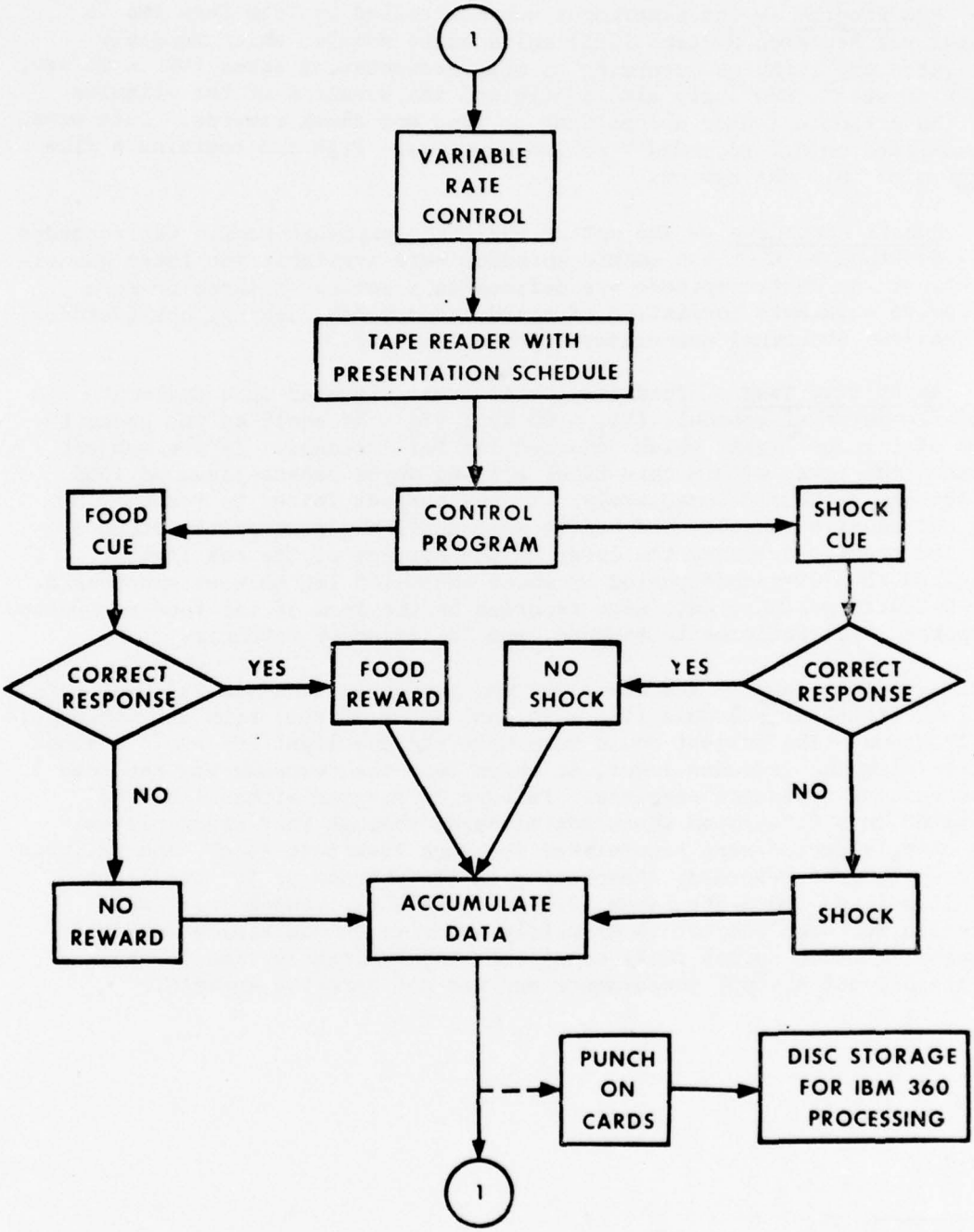

Figure 3. Flow diagram of BRS system.

DOSIMETRY

An accumulated total dose of 292 rads was programmed. (See Fig. 2 dose profile.) The SAM/RZ 9000 curie AECL cobalt-60 facility was chosen for this study because of the high dose rate available for "pulsed" exposures and the low dose rate for cruise.

The initial stage of the dosimetry procedure involved determining the free air exposure rates in roentgens/unit time necessary to deliver the required midline dose rates in rads/unit time. Using a rad-to-roentgen conversion factor of 0.95 and an approximate attenuation factor of 0.90 for midline dose (based on clinical depth dose data), exposure rates of approximately 115 and 11.5 R/hr were required to deliver 100 and 10.5 rads/hr midline, respectively. At the maximum possible exposure distance from the unattenuated source, 5.5 meters, the dose rate was approximately 275 R/hr; therefore, it was necessary to resort to lead attenuators to reduce the rate to the desired levels. Measurements with NBS-calibrated condenser R-Chambers and varying thicknesses of lead attenuation established that the desired exposure rates of 115 and 11.5 R/hr could be achieved at 5.5 meters from the source by using 0.5 and 2.06 inches (1.3 and 5.2 cm) of lead attenuation, respectively.

The physical size of the animal performance booths and the requirement to expose 2 animals simultaneously restricted the minimum exposure distance to about 2 meters; corresponding to an exposure dose rate of 33.5 R/min. This was equivalent to a midline rate of about 28.5 rads/min, using the conversion factors listed above.

The next phase involved measurements in Alderson tissue-equivalent primate phantoms to establish the midline dose rate (Table 2). The primate phantoms are constructed from an actual primate skeleton with Alderson Rando plastic which is tissue-equivalent to gamma rays. The physical size of the phantom corresponds closely to the primates used in this experiment. The phantoms are cross sectioned into eight segments, with holes drilled into each segment for insertion of dosimeters (Fig. 4). Figure 5 shows a cross section corresponding to the midepigastric region. Dosimetric measurements were made in the cross sections corresponding to the head, midepigastric, and lower abdominal regions of the animals for each of the required exposure configurations. The overall midline dose rate was determined at each position from the average of the midline doses obtained from all three sections. The phantoms were exposed in the same manner as were the experimental animals, seated in aluminum chairs inside the actual animal performance booth.

The midline dose is selected as the dosimetric point of reference because it has been found under whole-body exposure conditions to yield a close approximation to the overall average cross-sectional dose, upon which the biological effect is believed to primarily depend. This correlation between average dose and midline dose is illustrated in Table 2 where the dosimetric results from cross section 6 are tabulated

TABLE 2. DOSES MEASURED IN MIDEPIGASTRIC SECTION (SEC 6) OF ALDERSON PRIMATE PHANTOM FOR EACH EXPERIMENTAL EXPOSURE CONFIGURATION

Dosimeter site	Configuration I 3-min exposure (rads)	Configuration II 38-min exposure (rads)	Configuration III 3-hr exposure (rads)
Anterior	65	49	24
1	68	49	24
2	72	54	25
3	77	57	26
4 (midposition)	86--28.7 rads/min	63--99 rads/hr	29--9.7 rads/hr
5	93	65	31
6	96	68	32
7	88	62	30
8	86	60	28
9	85	60	28
10	84	60	28
11	--	62	29
Posterior	99	70	31
Right side	96	69	32
Left side	96	87	30
Cross-sectional av:	85--28.3 rads/min	62--97.9 rads/hr	28--9.3 rads/hr

for each of the exposure configurations used in this experiment. Note that the average cross-sectional dose agrees quite well with the midline dose for all three configurations.

Type 700 LiF thermoluminescent dosimeter (TLD) powder encapsulated in polyethylene tubing was used in the phantom measurements. The dose response of this material was determined by comparison to known cobalt-60 doses delivered on the AECL cobalt-60 source. This source has been calibrated with NBS-calibrated 3-terminal guard-ring chambers and condenser R-Chambers. The LiF powder was read out on a Harshaw Model 2000 TLD reader. Approximately five readings were obtained from each dosimeter site. Based on the results of these measurements, the midline dose rates were established at each exposure configuration (Table 3). These dose rates compare favorably with the target dose rates given in Figure 2.

Thermoluminescent dosimeters and R-Chambers were also exposed simultaneously with the phantoms in each configuration so that correlation factors with the measured midline doses could be obtained and used in monitoring the subsequent animal exposures. The TLD monitors were placed on the backs of the aluminum animal chairs. The R-Chamber monitors were positioned between the primate performance booths.

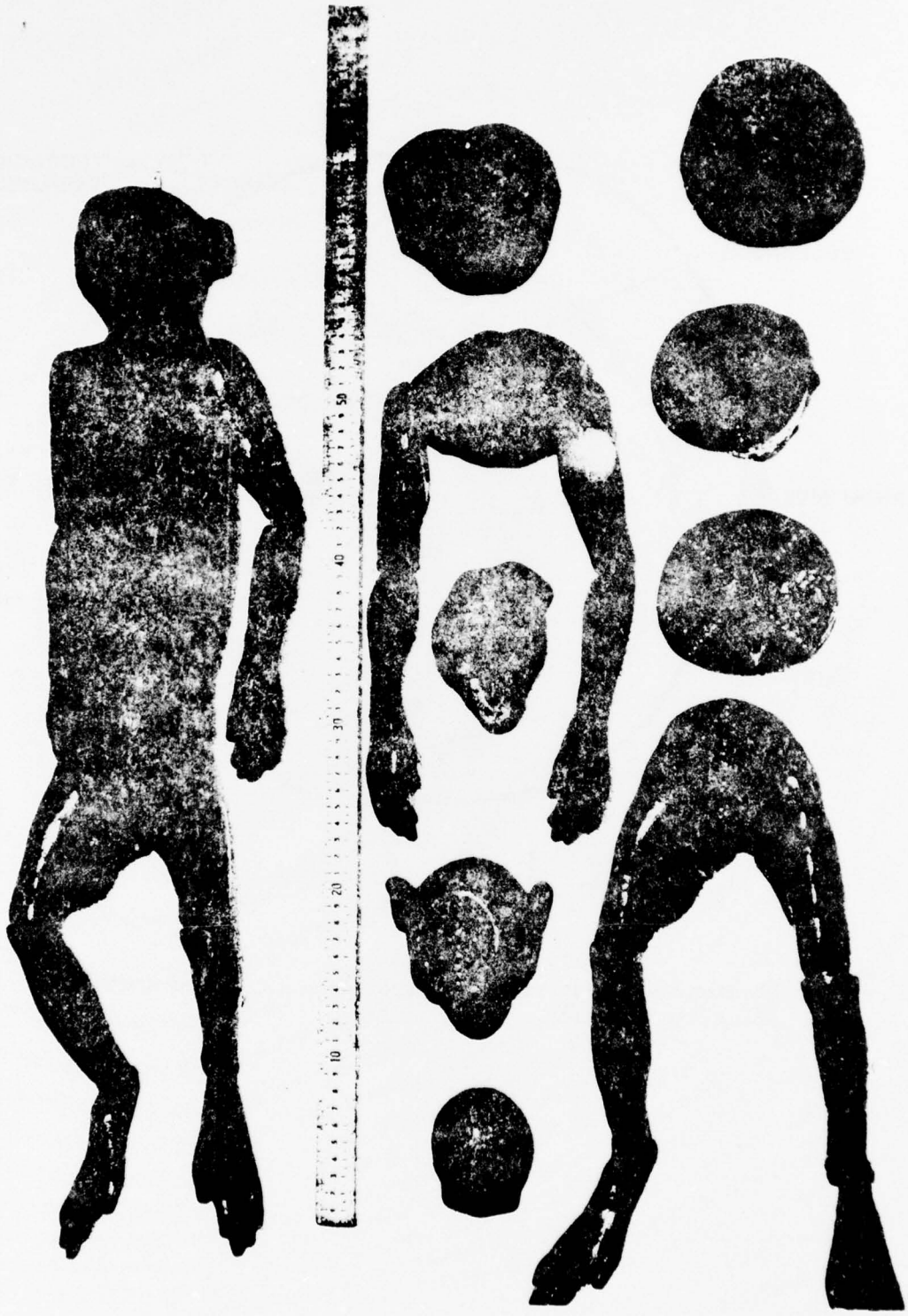

Figure 4. Phantom segments.

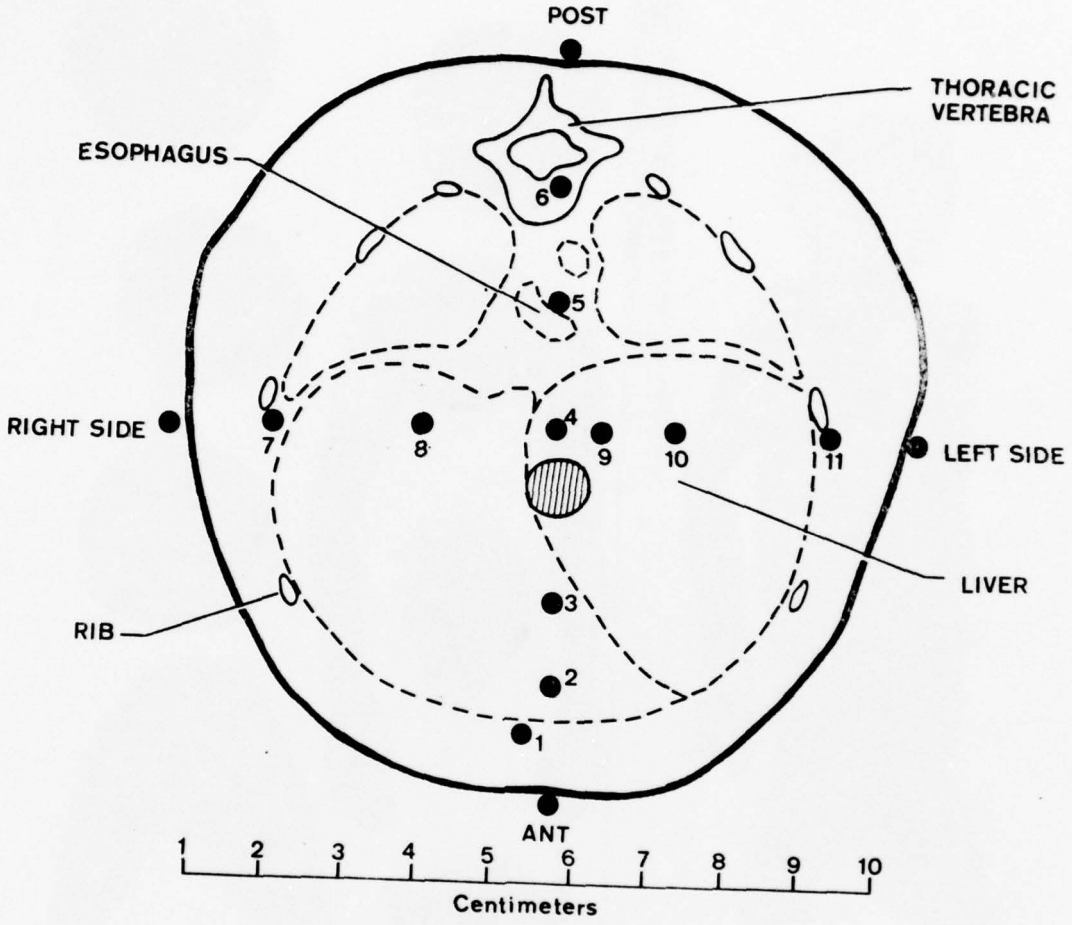

Figure 5. Phantom midepigastric cross section. (Numbered spots indicate dosimeter sites.)

TABLE 3. SUMMARY OF EXPOSURE CONFIGURATIONS

Configuration	Distance (meters)	Lead attenuation	Measured[a] midline dose rate	In air exposure rate
I	2.0	none	27.6 rads/min	33.5 R/min
II	5.5	0.5 in Pb (1.3 cm)	97.5 rads/hr	115 R/hr
III	5.5	2.06 in Pb (5.2 cm)	9.9 rads/hr	11.5 R/hr

[a]Average of midline dose measured in head, midepigastric, and lower abdominal sections of Alderson primate phantoms. These dose rates closely approximate the target dose rates given in Figure 2.

Figure 6 illustrates the exposure configurations used in the animal irradiation. The animals were exposed whole body, posterior-anterior, while seated in aluminum chairs inside of the performance booths. At 1 hour into the experiment, they were exposed to the unattenuated beam for 2 minutes at 27.6 rads/min midline. They were then moved back to 5.5 meters, and 0.5 inch (1.3 cm) of lead attenuator was placed in front of the source. Then at 2 hours into the run, they were exposed to approximately 62 rads at 97.5 rads/hr. Upon termination of this phase, a 2.06-inch (5.2 cm) lead attenuator was placed in beam and the 9.9 rad/hr (midline) exposure was begun. This continued until the 10th hour of the experiment, at which time the animals were again positioned at 2 meters and exposed for 3 minutes to the unattenuated beam. The 2.06-inch (5.2 cm) lead attenuator was then repositioned, the animals moved back again to 5.5 meters, and the 9.9-rads/hr exposure resumed until the 13th hour of the experiment--when the experimental run was terminated. Changeover time from one configuration to another took about 2 minutes. Five changeovers were required, for a total time of 10 minutes. The effect of changeover time on the total dose is considered negligible. The cumulative dose as a function of elapsed experimental time is shown in Figure 7.

Based on the measured dose-rate values, the total programmed dose was 303 rads. This dose compares favorably with the target dose of 292 rads. A summary of the primate exposures is given in Table 4; the results of the monitor dosimeters are included and indicate that all of the animals were exposed to within $\pm$ 6% of the programmed values.

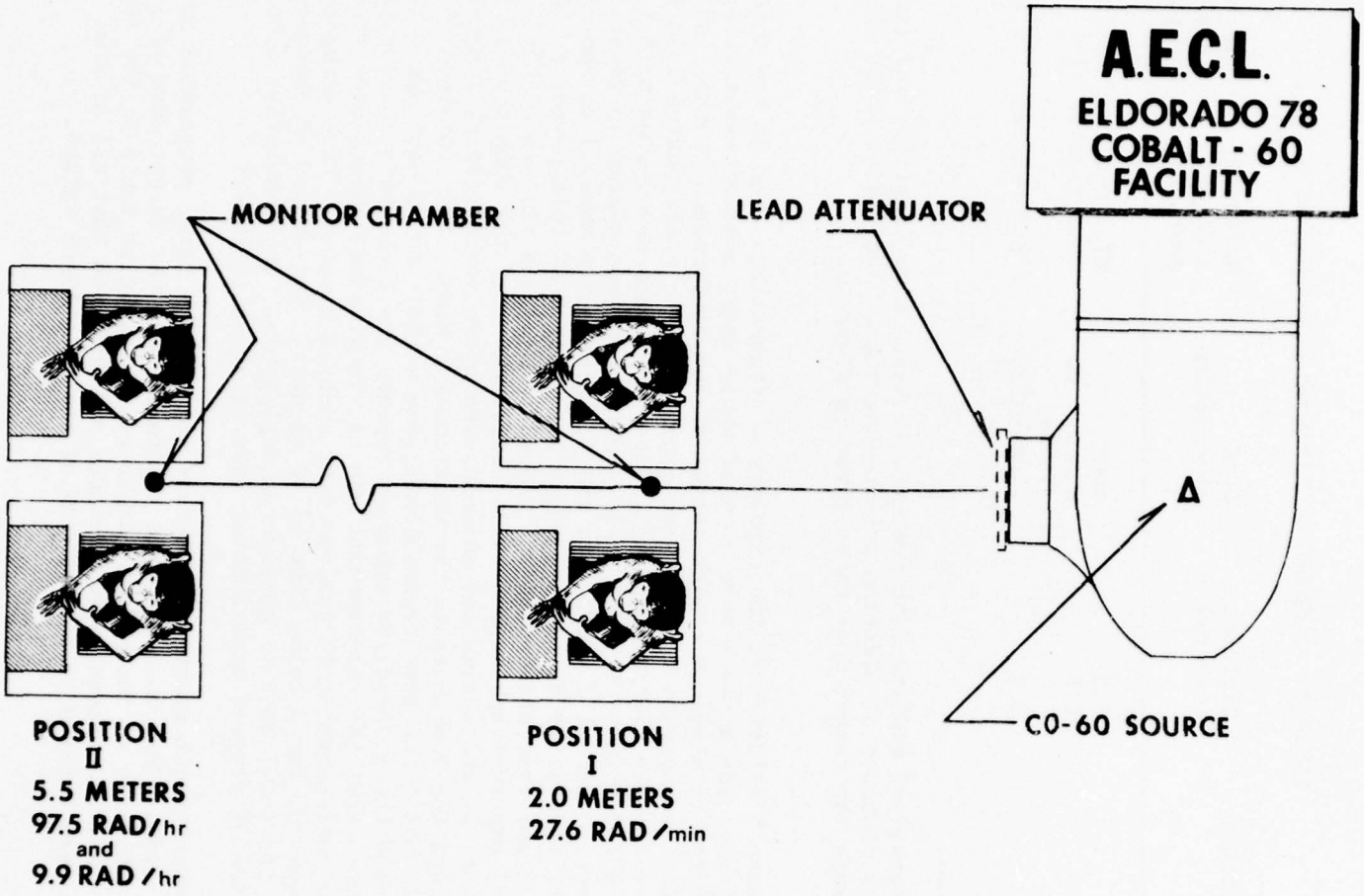

Figure 6. Primate exposure configuration.

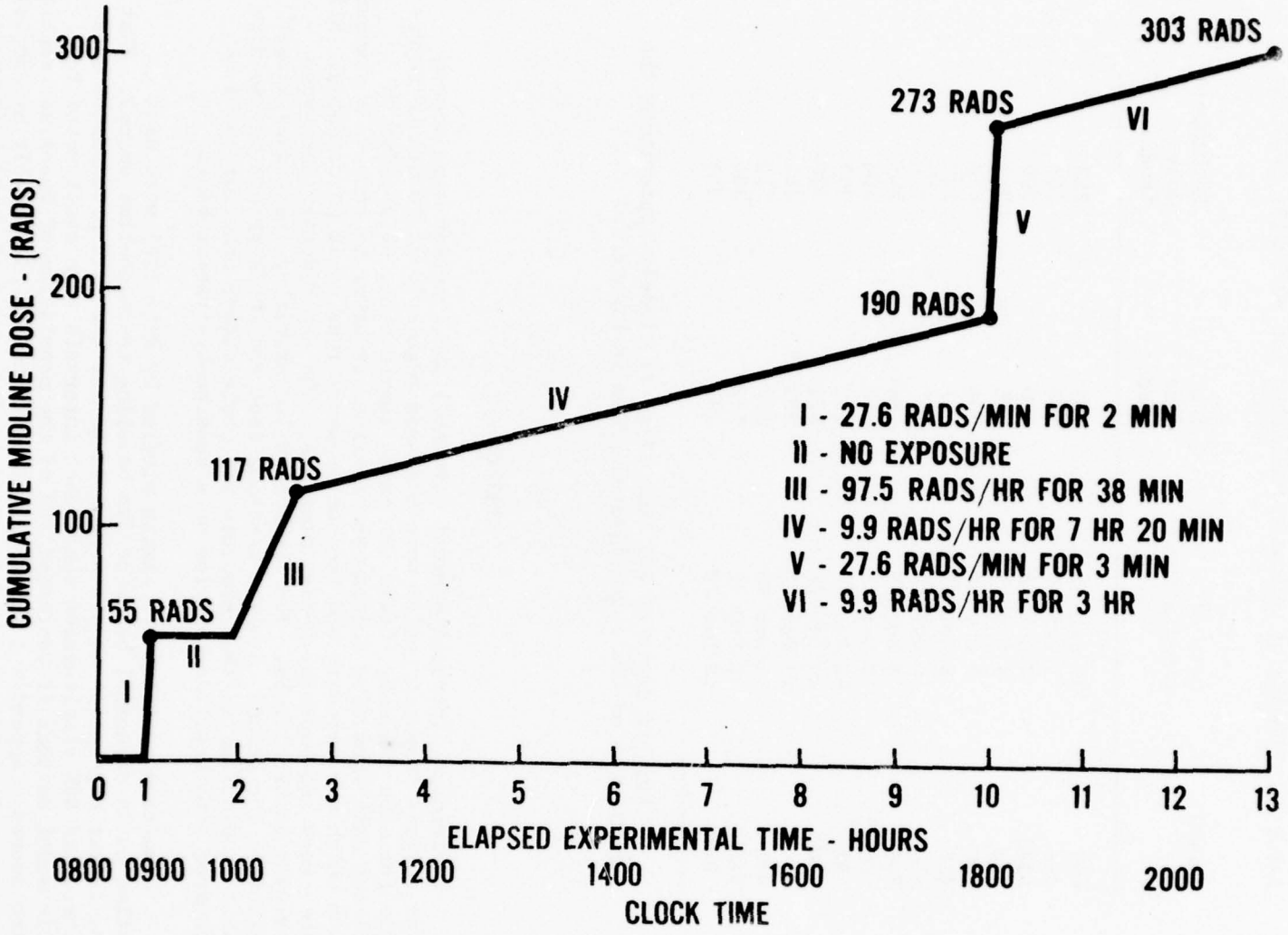

Figure 7. Cumulative dose vs. time.

TABLE 4. SUMMARY OF ANIMAL IRRADIATION AND DOSIMETRY RESULTS[a]

Animal No.	Date of irradiation	TLD dose (rads)	R-Chamber dose (rads)
446	30 Sep 75	304	313
468	1 Oct 75	319	307
134C	2 Oct 75	300	305
454	3 Oct 75	316	313
130	6 Oct 75	308	312
418	8 Oct 75	307	307
410	8 Oct 75	307	307
504	9 Dec 75	lost	304
50C	9 Dec 75	312	304
92	10 Dec 75	293	307
460	10 Dec 75	319	307
424	11 Dec 75	299	318
490	11 Dec 75	286	318
540	12 Dec 75	286	306
54	12 Dec 75	299	306

[a]Program doses of 303 rads (Fig. 7) closely approximate the target dose of 292 rads (tissue) given in Figure 2.

RESULTS

Performance (percent correct response) and reaction-time scores (for correct responses only) were measured regularly at 20-minute intervals for each subject. Given our small sample size, we decided to collect data from five successive baselines in order to provide a standard with which one exposure and two postexposure runs could be compared. All runs were separated by 2-day intervals. The experimental data were analyzed on two levels. The first entailed examining individual animal effects. The second involved treating food and shock groups as two distinct populations so that exposure and postexposure behavior could be compared with baseline behavior on a session-by-session basis.

Simultaneous tolerance limits studied by Rahe (15) were used to define bands of normal behavior for baseline reaction-time scores. That is, linear regression models were used to fit the five preexposure baselines, and 95% simultaneous confidence intervals were constructed for this model so that it contained 95% of the population of baseline reaction-time scores. Appendix A summarizes these findings pictorially by subject. A total of 3 of 7 food (animals 50, 410, 424) and 3 of 8 shock (animals 134, 446, 454) subjects exhibited delayed reaction times by this criterion.

Page's distribution free test (8) for ordered alternatives indicated no reaction-time baseline trend for these 3 shock animals. For the 3 food animals, however, the test indicated a baseline trend towards shorter reaction times.[d] We find it significant to note that exposure-day reaction times reversed this trend in these food animals.

Using the maximum deviation between exposure reaction time and the reaction times defined by the regression model as "normal" behavior, monkeys No. 454 (shock) and No. 50 (food) had the greatest change in reaction times of all subjects in their respective groups. By the same criterion, No. 454 took up to 0.26 second longer to respond while No. 50 took up to 0.46 second longer. We also note that only No. 454 exhibited longer-than-normal reaction times on both postexposures. However, monkeys No. 446 (shock) and No. 410 (food) showed longer-than-normal reaction times on the second postexposure. The remaining 4 of 7 food animals (Nos. 130, 418, 460, 540) were too variable to make decisions concerning their reaction times, as was the case in 1 (No. 490) of the remaining 5 shock animals. The other 4 shock subjects (Nos. 92, 54, 468, 504) indicated normal reaction times based upon this criterion. When there is a detectable reaction-time delay, it appears to take place for an entire session for the shock group; whereas a delay in the food group is of longer duration, but occurs more sporadically.

Performance effects were also examined on a by-subject basis. A pictorial summary of shock performance scores is given in Appendix B. Two of 8 shock animals (Nos. 454, 468) indicated lower and more variable performance scores during the exposure and first postexposure periods; No. 468 achieved a new minimum performance score of 48%. The increased variability and negative trend in No. 468's fifth baseline was attributable to the presence of maintenance personnel in the training room which distracted the subject during this baseline.

The food animals were not as highly motivated as the shock subjects. Their baselines were highly variable from day to day and seldom exhibited clear-cut strategy in animal behavior. Nevertheless, radiation effects in the form of work cessation were readily apparent (Appendix C) in 2 of 7 food monkeys (Nos. 50, 410). In the consistency of baseline scores, No. 410 most closely resembled the shock subjects. His unusual behavior during the first baseline was attributed to a malfunctioning feeder--hence, the decline in his performance. Neglecting this baseline, his usual performance score in the remaining four baselines was in the 90's,

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[d] Confidence limits for food animals were constructed the same way as confidence limits for shock animals. The existence of a baseline trend in food animals makes it difficult to separate this effect from the error variance. Our results are conservative compared to an analysis based only on limits constructed for the last baseline.

with one 44% minimum performance score of 20-minute duration. In contrast, he had zero performance for 2 hours 40 minutes during exposure; for 5 hours 40 minutes during the first postexposure period; and for 9 hours 40 minutes during the second postexposure period. Food monkey No. 50 exhibited far less consistent baseline behavior. He does, however, suggest a willingness to perform prior to exposure. In contrast, his exposure day is represented by 4 hours 40 minutes of zero performance and a total of 8 hours of less than 10% performance, followed by a recovery in performance during the two postexposure periods.

The basic data (Appendix D) were smoothed in order to examine population effects among all food and all shock subjects. This was done by examining:

1. A single measure of session performance and of reaction time for each group. (Performance was the number of correct responses in session i divided by the number of trials in session i. A similar measure was used for session reaction time; that is, it was computed over session i for the correct responses.)

2. The consistency of performance and reaction scores via session standard deviations of the 20-minute scores.

3. Worst cases; i.e., minimum 20-minute performance or maximum 20-minute reaction session scores.

4. Fatigue or improvement trends via slopes of least-square regression lines fitted to 20-minute scores.

5. Initial session scores via adjusted intercepts of regression lines fitted to 20-minute scores.

Friedman rank sums were computed on these scores for each group on a session basis (8). When Friedman's test indicated significance at the $\alpha = .05$ level, exposure runs were contrasted with baseline and postexposure runs at the $\alpha = .05$ level by a multiple comparison procedure developed by Dunnett (4). Table 5 summarizes significant findings by session and group for each of these variables.

The study attempted to control S- food intake prior to and during exposure since time after feeding is important. Emetic episodes were experienced by 4 of 7 food subjects, in contrast to 1 of 8 shock subjects. Most emetic episodes occurred in subjects that responded early, supporting the hypothesis of individual susceptibility--the earlier the onset of nausea and vomiting, the more severe the syndrome may be (6). Table 6 summarizes the details of these episodes. Comparison of the data was not attempted owing to the small sample size of each group. The continual presence of food for the S+ group likely accounted for their excessive emetic responses relative to the S- group. We note that animals 540 (food) and 134 (shock) had shorter emetic episodes than did 8 nuclear accident

TABLE 5. EXPOSURE AND NONEXPOSURE COMPARISONS (α = .05) FOR REACTION AND PERFORMANCE

Session	Food animals 1	2	3	4	Shock animals 1	2	3	4
Cumulative dose (rads)	120	150	180	300	120	150	180	300
Avg presentations/20-min interval	37	38	30	60	37	38	30	60
Reaction time								
Score			E>B2,P1					
S.D				E>B2,B3,B5				
Max.			E>B2,B5	E>B2,B5				
			E>P1	E>P1				
Slope		E>B4,B5						
Intercept			E>B2					
Performance								
Score		E<B2,B5	E<B2,B5	E<B2,B5	E<B1,B3			E<B1,B3
					E<B4,B5	E<B4,B5		E<B5
					E<P1			
S.D.		E>B2,B4			E>B1,B3			E>B1,B3
					E>B4,B5	E>B5		
					E>P1,P2			
Min.		E<B2,B5	E<B2,B5	E<B2,B5	E<B1,P1	E<B1,B5		
Slope								
Intercept			E<B5		E<B1,B4			E<B1,P1
					E<B5,P2			

TABLE 6. SUMMARY OF EMETIC FINDINGS

Subject No.[a]	Onset (h:m:s)	Offset (h:m:s)	Duration (m:s)	No. of Contractions	Time since last episode (h:m:s)	Accumulation dose (rads) at episode
130 (F)	4:00:04	4:00:36	:32	7		140
	4:55:30	4:56:35	1:05	15	:54:54	143
50 (F)	2:47:30	2:48:24	:54	8		130
	3:04:20	3:09:00	4:40	31	:15:56	130
	4:13:50	4:15:35	1:45	34	1:04:50	140
460 (F)	5:39:17	5:39:52	:35	24		155
	6:48:25	6:49:30	1:05	33	1:08:33	167
	7:47:30	7:47:58	:28	17	:58:00	177
540 (F)	11:21:50	11:22:15	:25	4		295
134 (S)	10:16:00	10:16:37	:37	8		285
	10:58:00	10:58:23	:23	9	:41:23	292

[a]Group: Food (F), Shock (S)

victims in the 236-365-rad partial-body dose range reported by Zellmer (18); they also had considerably later onset times than did the accident victims. The other animals appear to agree with the cases given by Zellmer. As noted by Warren and Bowers (17), radiation sensitivity varies considerably between species as well as within species.

CONCLUSIONS

Low levels of gamma radiation can impair performance. While 2 of 7 food animals ceased performance completely, only 1 of 8 shock animals had a minimum performance score as low as 48%. The remaining shock animals showed no operationally significant performance effects. Radiation seems to affect the shock group's performance during the simulated penetration and last-cruise phases of the hypothetical crew work schedule, after accumulation of about 190 rads, rather than during earlier phases. In contrast, the food group appears to cease performance after accumulation of 117 rads, where refueling and later tasks of the crew work schedule could be operationally affected. Our interpretation of these performance differences between the two groups is that negatively reinforced (shock) subjects provide the most stable performance baselines for the profile given in Figure 2. The reinforcement contingency (motivation) for the food group permits a nonexternal-threat type stress that allows the subject a wide latitude of response behavior (whether to respond at all, how fast to respond for a period of time, and whether or not to eat available food before responding again). Shock subjects do not have such flexibility. Their motivation is quite different; they "must" respond within 1 second or else experience unpleasant shock. Their reaction times and variability in their performance accuracy were significantly diminished during both training and baseline conditions. The shock group not only maintained greater frequency of responding, they also showed the effects of radiation and/or fatigue later in the mission. On the other hand, the optional nature of the reinforcement contingency, coupled with the effects of nausea and emesis for the food group (with its continual availability of food), created performance deterioration much earlier in time.

Low levels of gamma radiation can cause an increase in reaction time. Reaction delays in the shock group appear to occur for entire sessions, whereas delays in the food group are sporadic but of longer duration. Motivation may account for these differences. Based upon reaction-time comparisons with the regression model, the slowest animal in the shock group took approximately 0.26 second longer than normal to respond to a cue, while the slowest animal in the food group took approximately 0.46 second longer. For the shock group, reaction times appear to be more sensitive to radiation than performance scores. Because they were avoiding shock, their response accuracy was usually near 100% for preexposure baselines, and their associated reaction times were generally shorter than those of the food subjects. The shock subjects, therefore, could take longer to respond and still maintain almost 100% accuracy scores. Their shorter and less variable reaction times enhanced the probability of finding statistically significant exposure times for the shock group.

Reinforcement contingency is a crucial factor in assessing performance decrements attributed to low doses of radiation. Highly motivated (shocked) subjects can perform their task more easily in this environment. Diet and/or motivation plays an important role in affecting emetic responses in low-dose environments. The greater the amount or more recent the food intake, the greater the chance for productive emesis. The food subjects ingested food pellets until retching occurred, and often would even take a pellet after the onset of retching. Emesis by 4 of 7 food subjects and by only 1 of 8 shock subjects supports the food/emesis hypothesis. Shock monkeys were fed their normal portion of biscuits, which would have been mostly digested before 125 rads had been accumulated (4 hours into the mission).

Table 7 indicates animals showing apparent radiation effects on reaction time, performance, and emesis. Note that performance and reaction-time effects need not coincide; i.e., one can occur in the absence of the other. Baseline behavior was too variable for monkeys Nos. 130, 460, and 540 to determine clear-cut reaction and performance effects.

TABLE 7. RADIATION EFFECTS

Subject No.	Emesis	Performance	Reaction time
Shock			
134	+		+
446			+
454		+	+
468		+	
Food			
50	+	+	+
410		+	+
424			+
130	+		
460	+		
540	+		

+ = radiation effect

All subjects were regularly checked through the days following exposure. No emesis occurred for any subject after removal from the exposure cell. The animals were closely monitored to detect any vomitus on their fur, particularly around the face, and the cage floor area was examined.

When removed from the test situation, more than half of the subjects exhibited mild but noticeable facial erythema. All subjects continued to drink water, but a wide range of consumption was apparent. Some subjects would not eat a monkey biscuit immediately, but all of them readily accepted and immediately consumed any type of fresh fruit. As noted earlier, some food subjects continued to perform poorly during the two postexposure runs.

Of the 4 (of 7) food subjects experiencing emesis, none had an episode during a period when the light was lit. The 1 shock subject with productive emesis continued to work (as recorded on video tape) with no visible response degradation. During the period of retching and emesis, only one trial was missed--totally consistent with the subject's previous work record. The subject obviously experienced discomfort and inconvenience in attempting to continue to work the task (which was a high presentation rate at that point).

The need to predict man's ability to function in a nuclear radiation environment is important to planners and commanders. Credibility of the manned portion of the TRIAD of strategic forces is contingent upon accurate nuclear vulnerability and survivability assessments (1). A 12-hour, 300-rad gamma radiation experiment using trained rhesus monkeys resulted in statistically significant radiation effects on their performance. Direct extrapolation of performance decrements in these animals performing relatively simple tasks to human aircrew members performing enormously more complex tasks is difficult. However, these results strongly suggest that some deleterious effects would occur.

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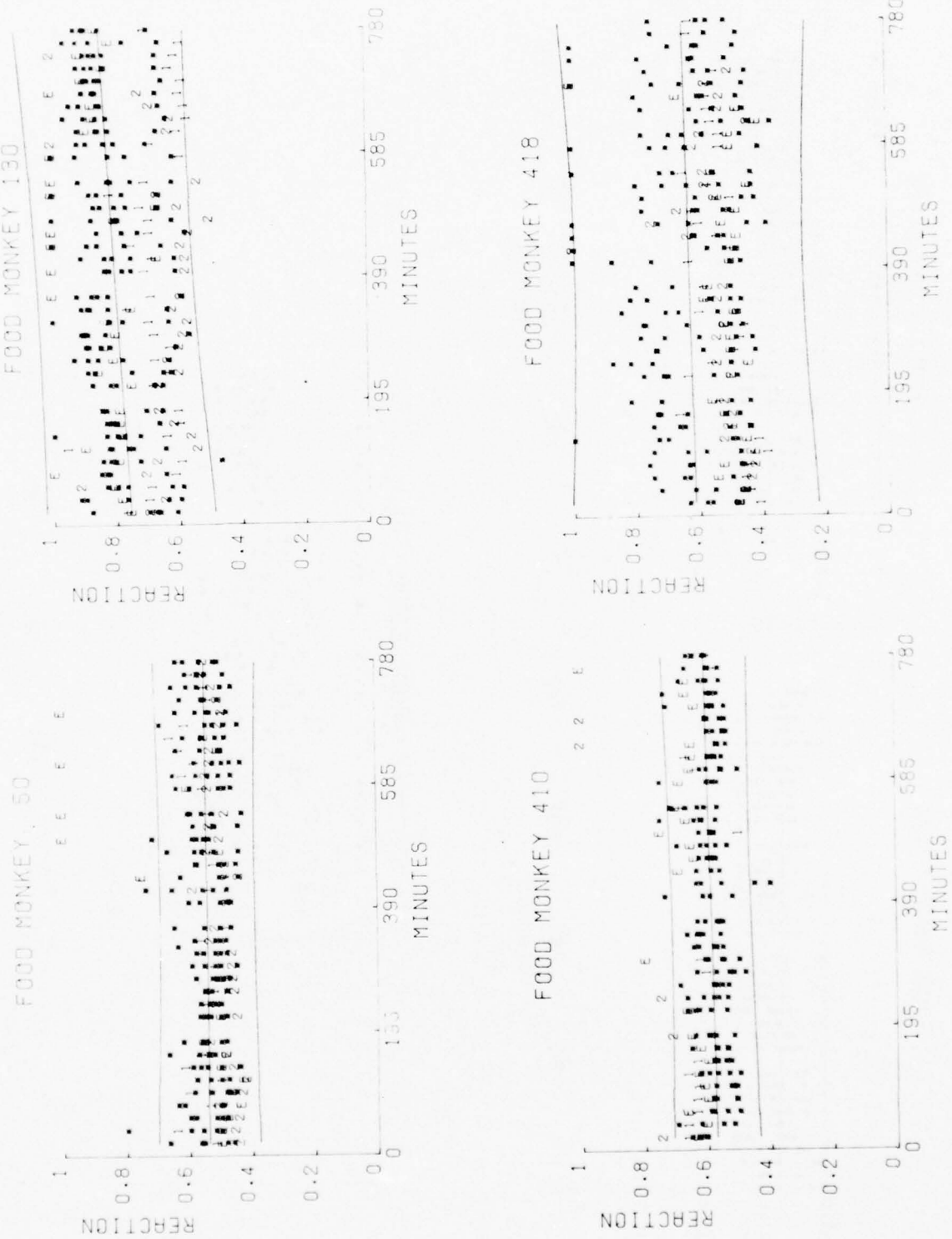
APPENDIX A

PICTORIAL REACTION-TIME SUMMARY

Linear regression models are fitted to five preexposure baselines (squares). We present 95% simultaneous confidence intervals which contain 95% of the population of baseline reaction-time scores. The E's denote exposure values, and the 1's and 2's represent first and second postexposure scores, respectively. Values above the upper tolerance limits indicate significantly longer reaction times than could be predicted from baseline reaction scores.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FOOD MONKEY 418
FOOD MONKEY 50
FOOD MONKEY 410
REACTION
MINUTES
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390
585
780
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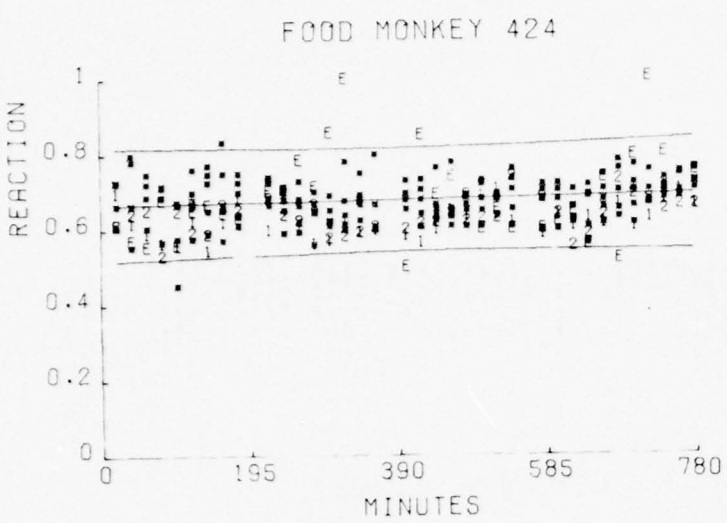
0.6
0.8
1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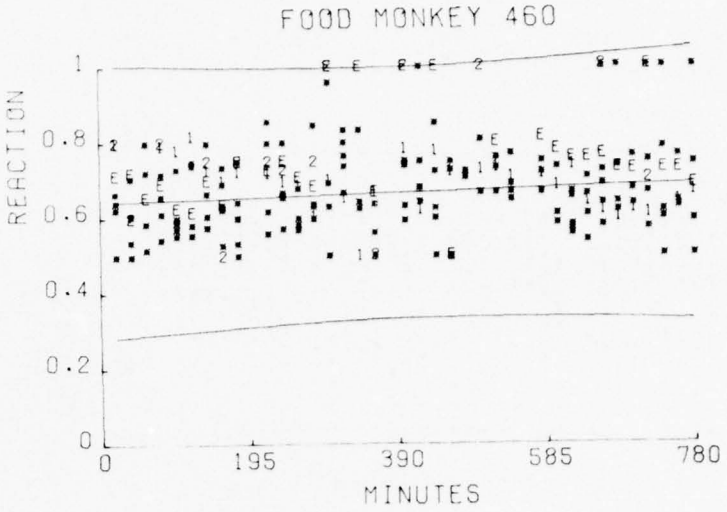
390
585
780
MINUTES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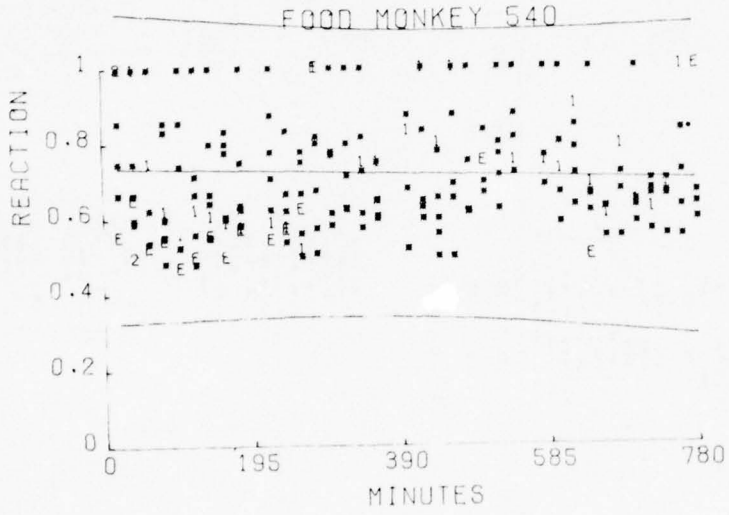
0
0
195
390
585
780
MINUTES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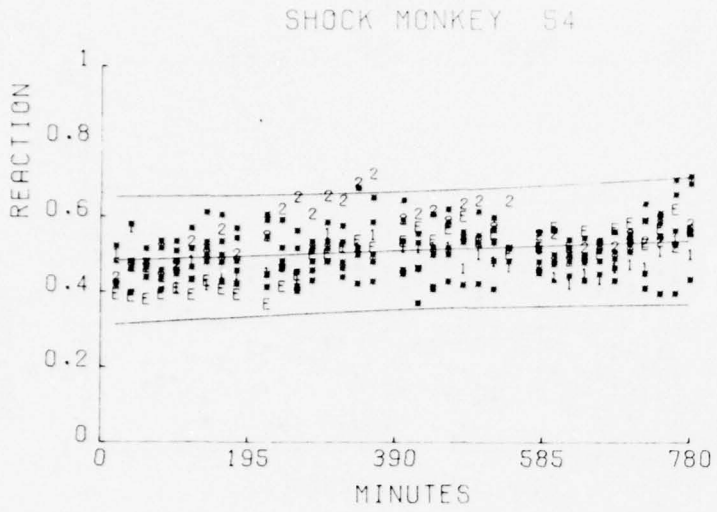
0
0
195
390
585
780
MINUTES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0
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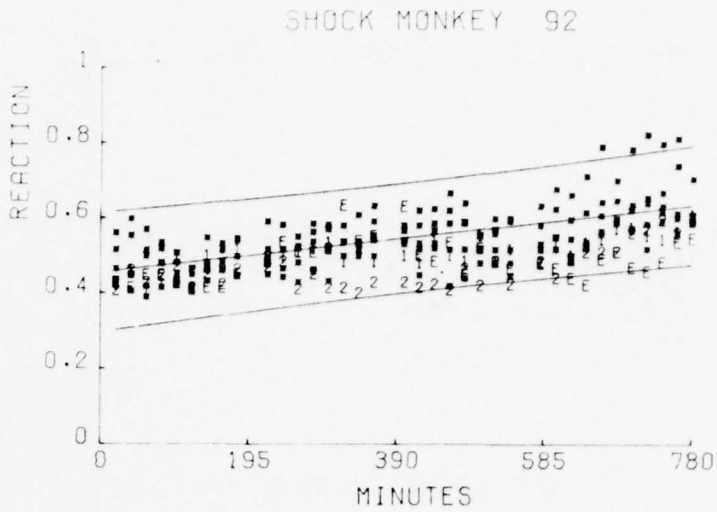
390
585
780
MINUTES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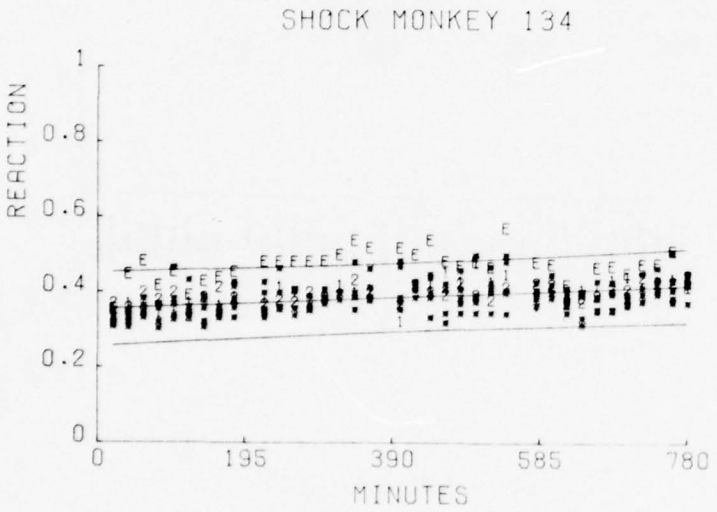
390
585
780
MINUTES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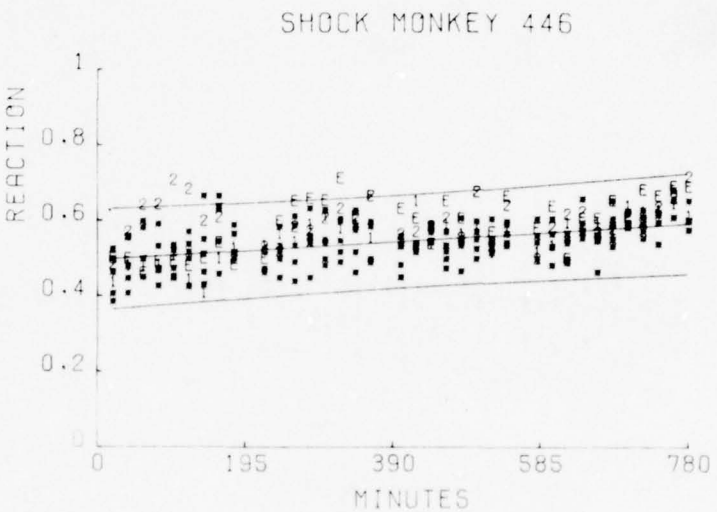
0
195
390
585
780
MINUTES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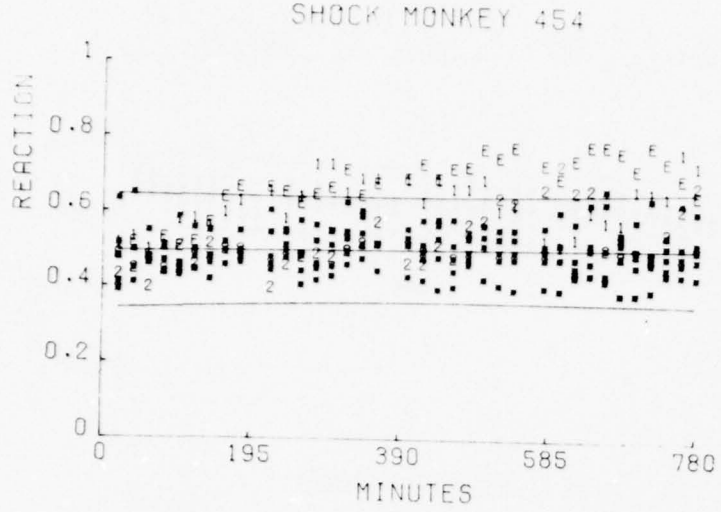
390
585
780
MINUTES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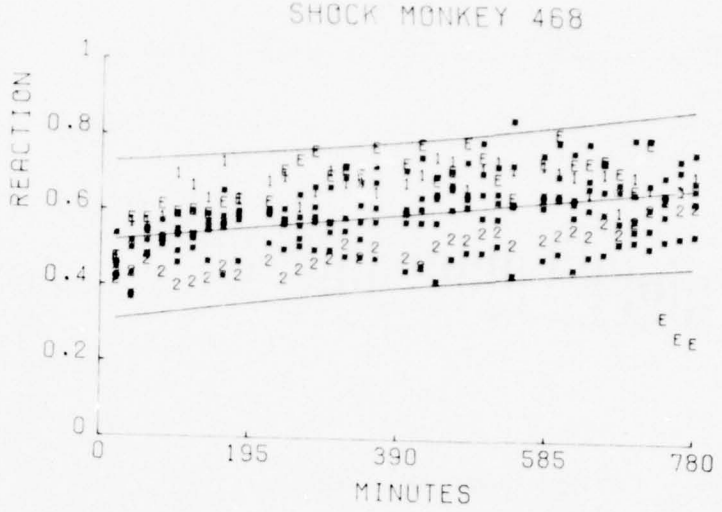
390
585
780
MINUTES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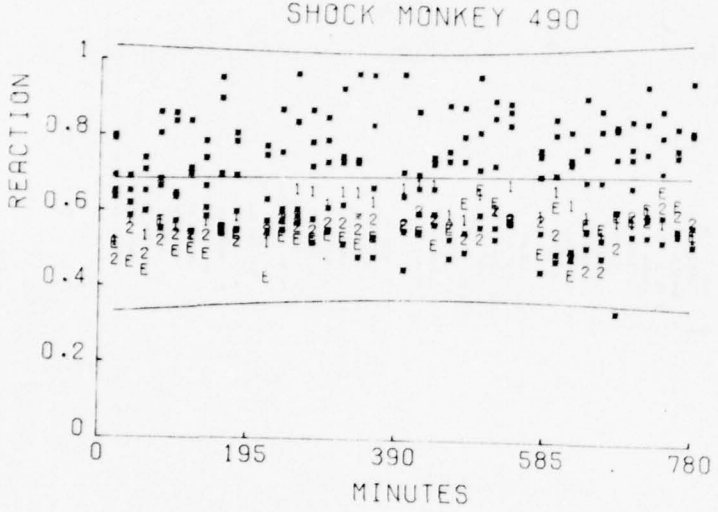
0.2
0
0
195
390
585
780
MINUTES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0
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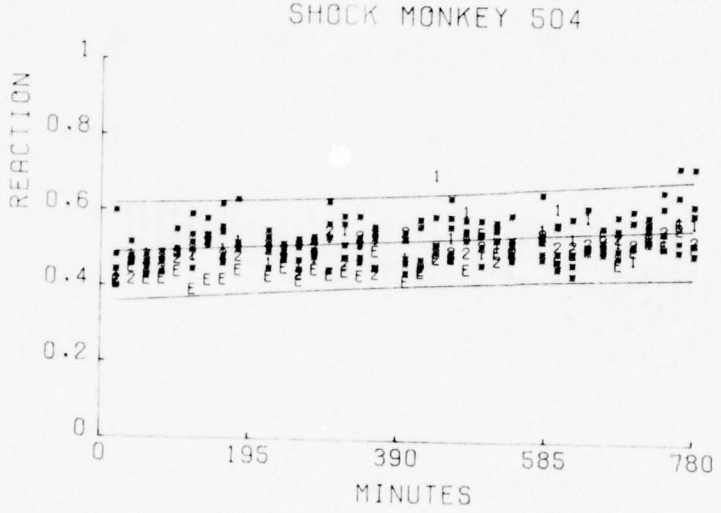
390
585
780
MINUTES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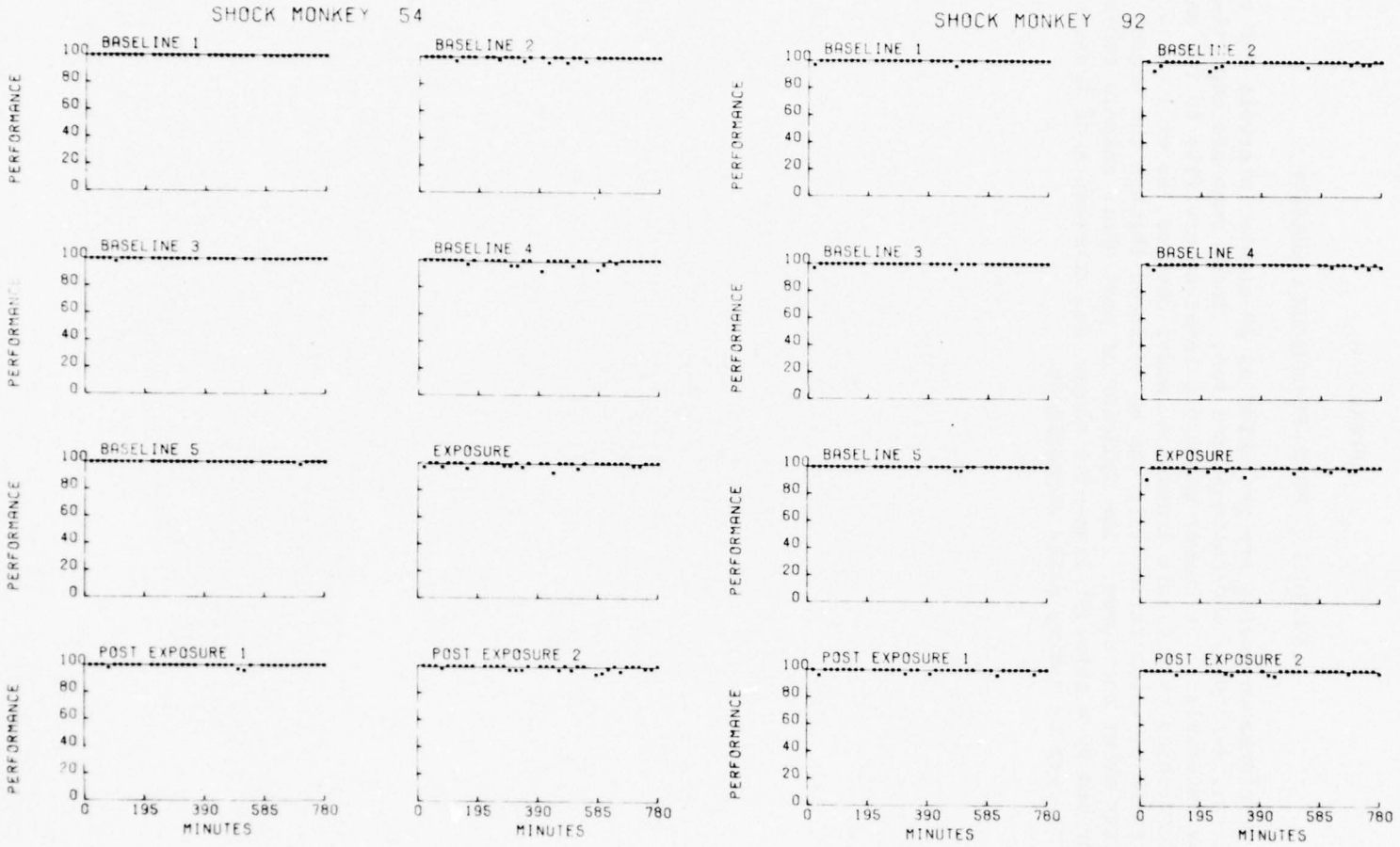
0.6
0.4
0.2
0
0
195
390
585
780
MINUTES

APPENDIX B

PICTORIAL SHOCK-PERFORMANCE SUMMARY

Performance scores are presented at 20-minute intervals for each baseline, exposure, and postexposure run. These runs are separated by 2-day intervals. The curves shown are least-square fits to the data and are presented to indicate trends and model changes, as well as to be a yardstick by which variability can be measured through the amount of scatter about the curve. The behavior of most shock animals can be described by a straight line—the slopes and intercepts of these curves can be used in making daily comparisons.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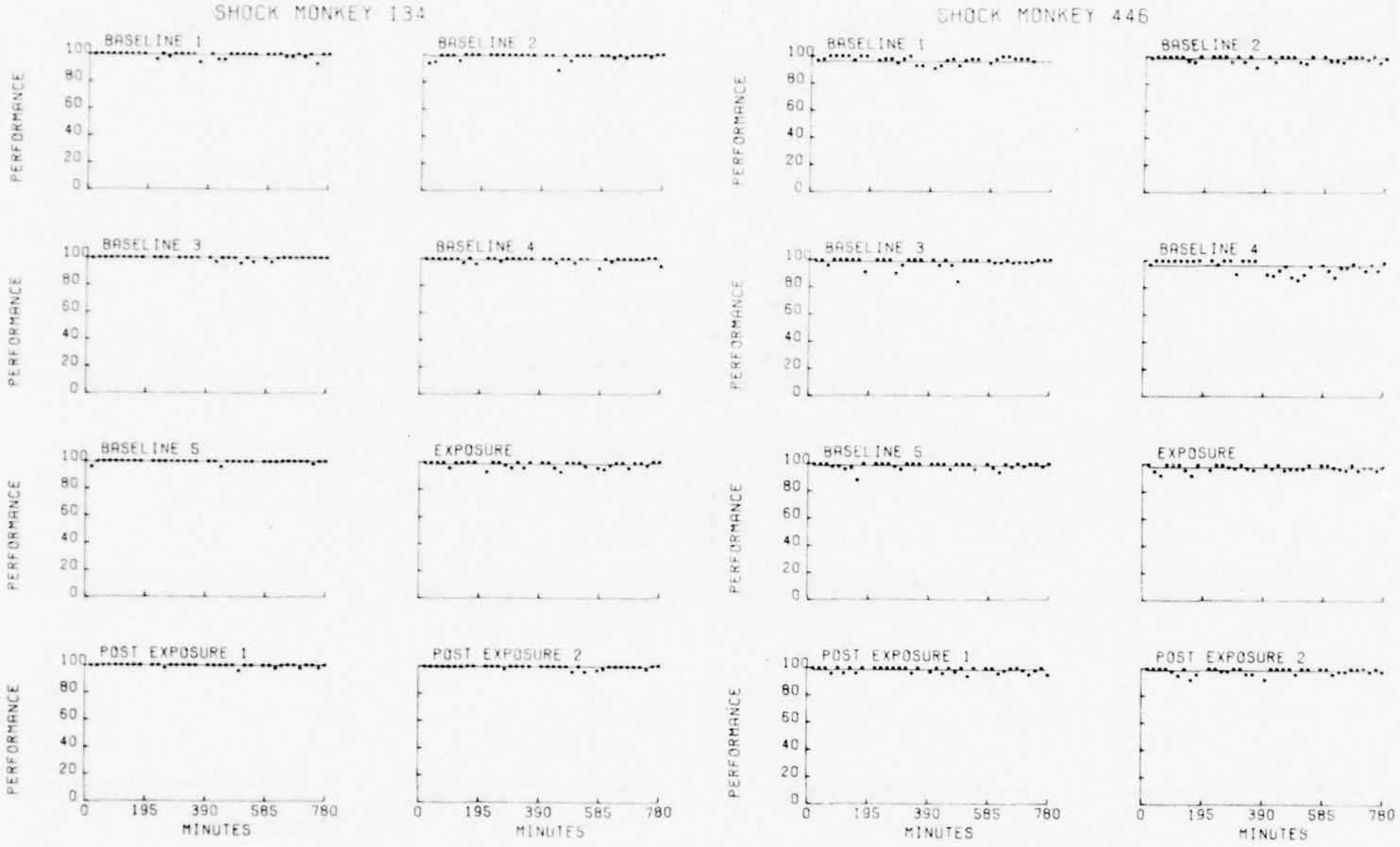
60
40
20
0
0
195
390
585
780
MINUTES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BASELINE 2
BASELINE 3
BASELINE 4
BASELINE 5
EXPOSURE
POST EXPOSURE 1
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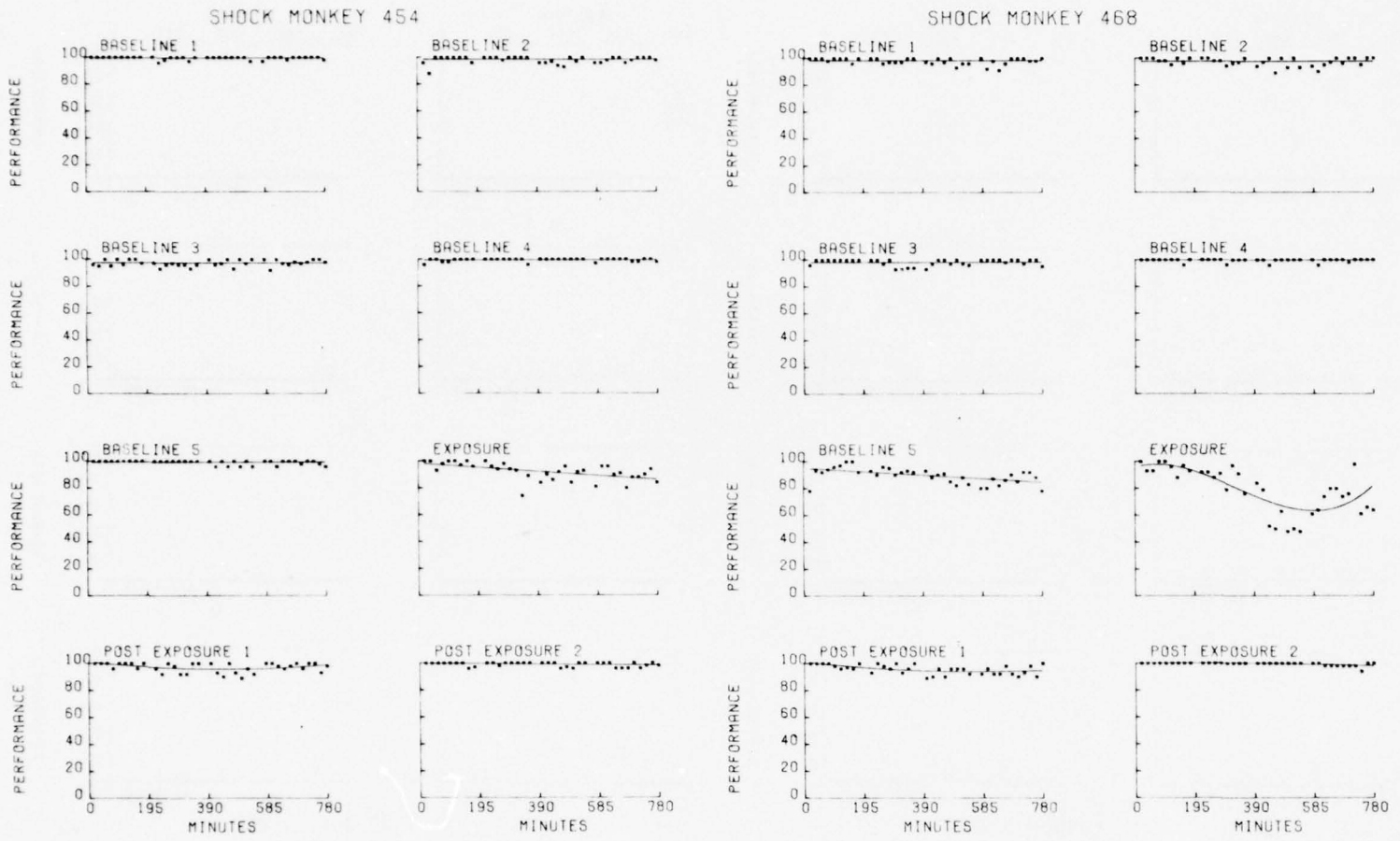
20
40
60
80
100
195
390
585
780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PERFORMANCE
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80
60
40
20
0
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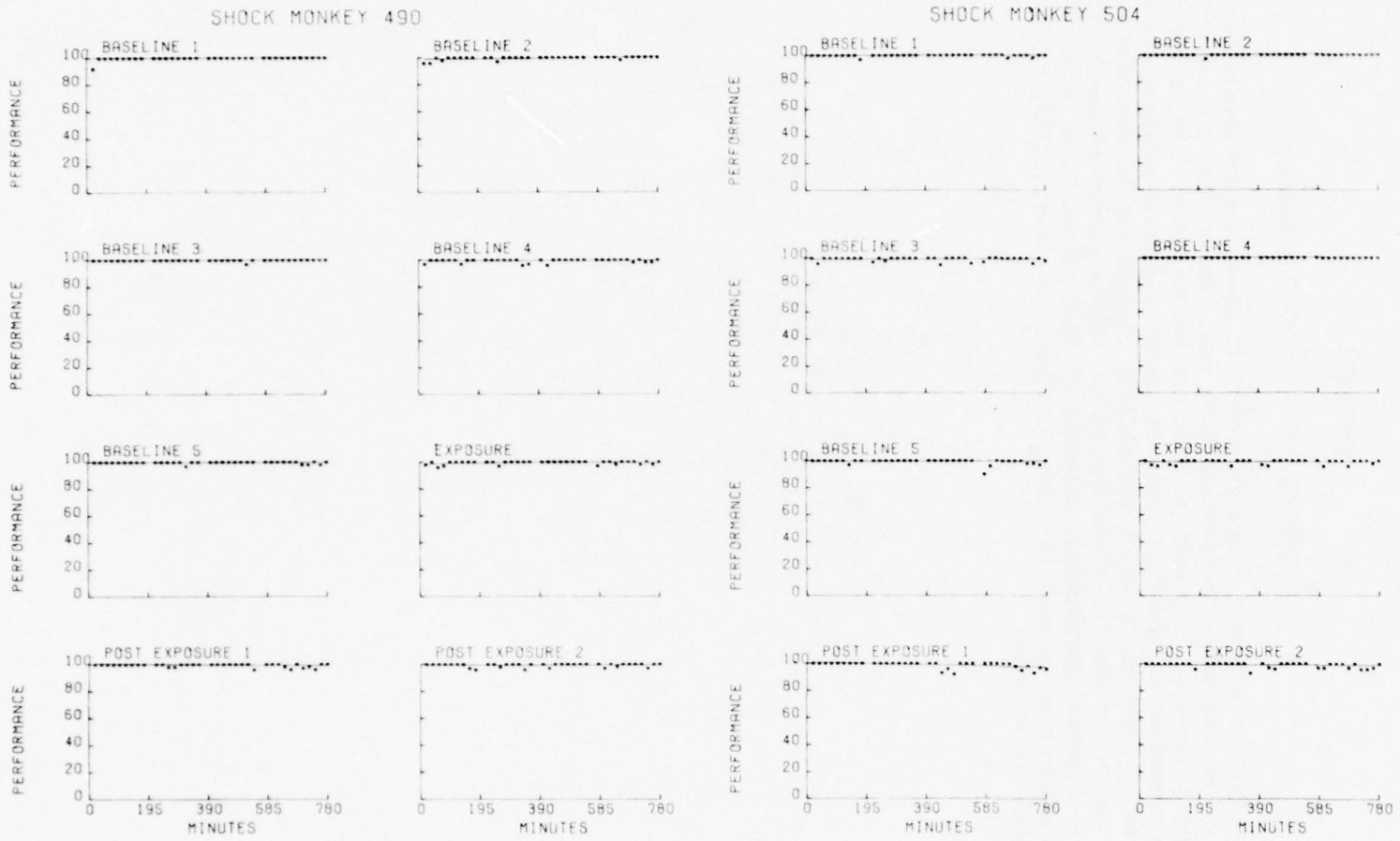
195
390
585
780
MINUTES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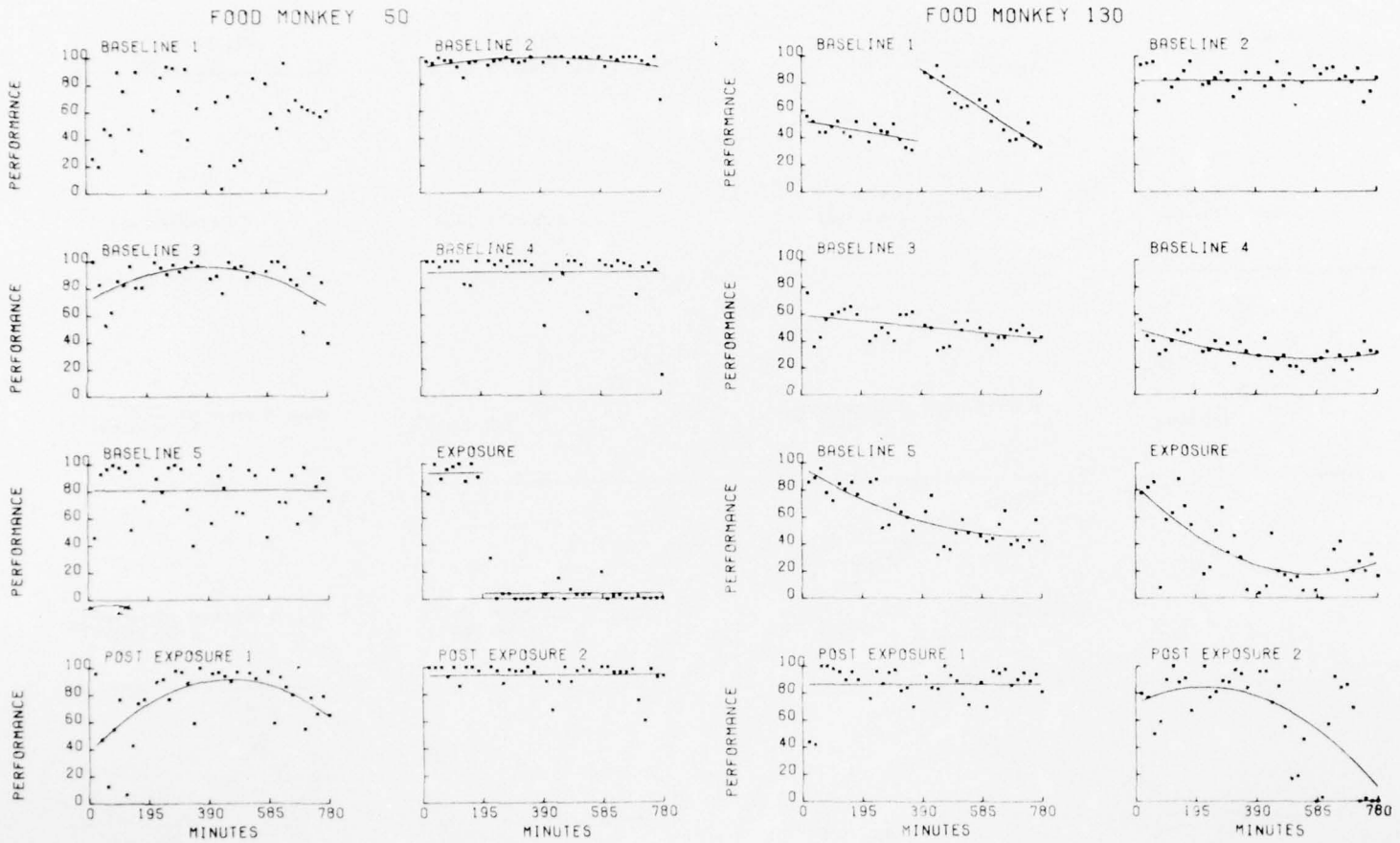
SHOCK MONKEY 504
BASELINE 1
BASELINE 2
BASELINE 3
BASELINE 4
BASELINE 5
EXPOSURE
POST EXPOSURE 1
POST EXPOSURE 2
PERFORMANCE
0
20
40
60
80
100
0
195
390
585
780
MINUTES

APPENDIX C

PICTORIAL FOOD-PERFORMANCE SUMMARY

Performance scores are presented at 20-minute intervals for each baseline, exposure, and postexposure run. These runs are separated by 2-day intervals. The curves shown are least-square fits to the data and are presented in order to indicate trends and model changes, as well as to be a yardstick by which variability changes can be measured through the amount of scatter about the curve. These curves emphasize the lack of a clear-cut performance strategy in food subjects, as well as their low motivation to work this task following any disruption, e.g., environmental disturbance.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FOOD MONKEY 130
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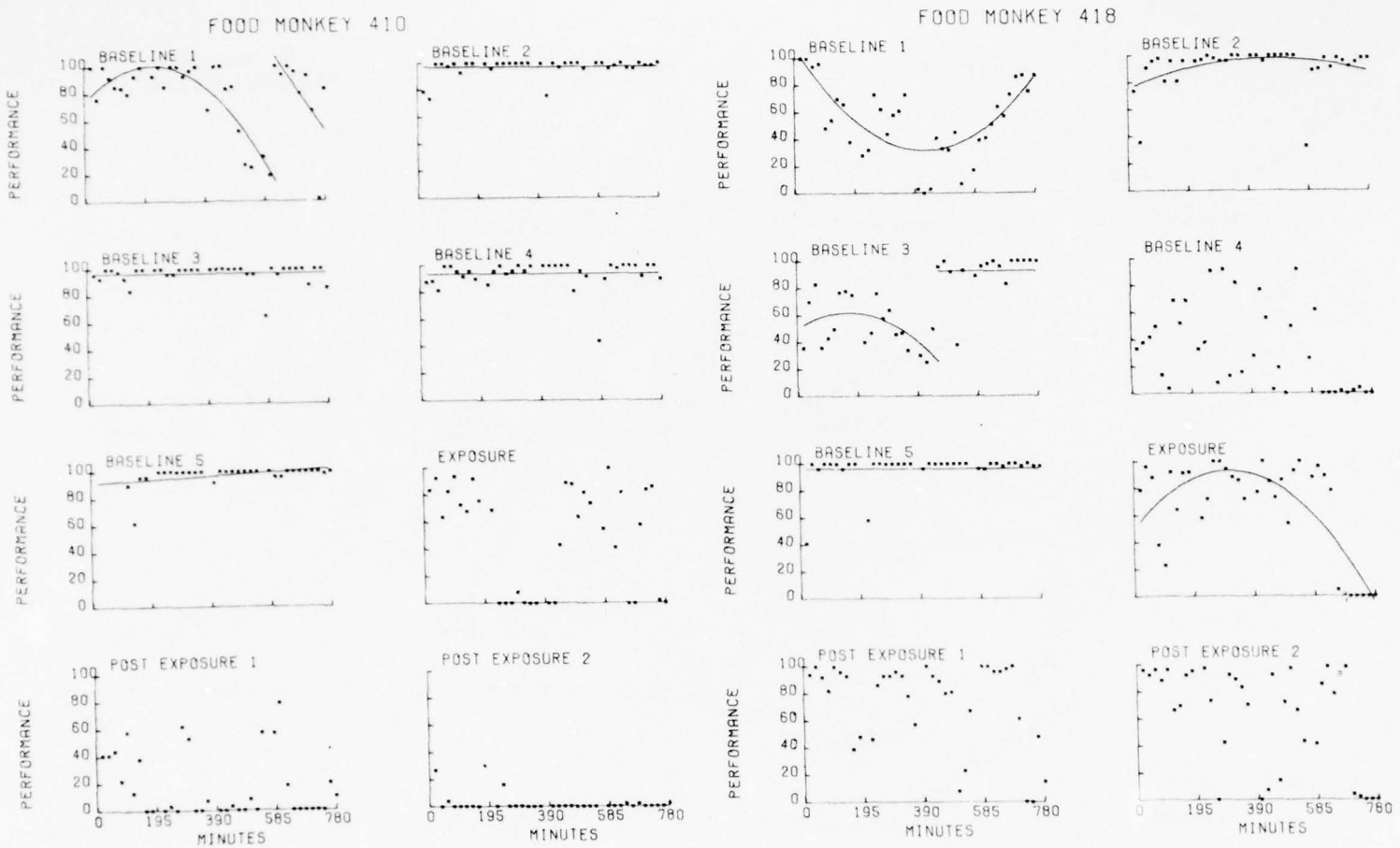
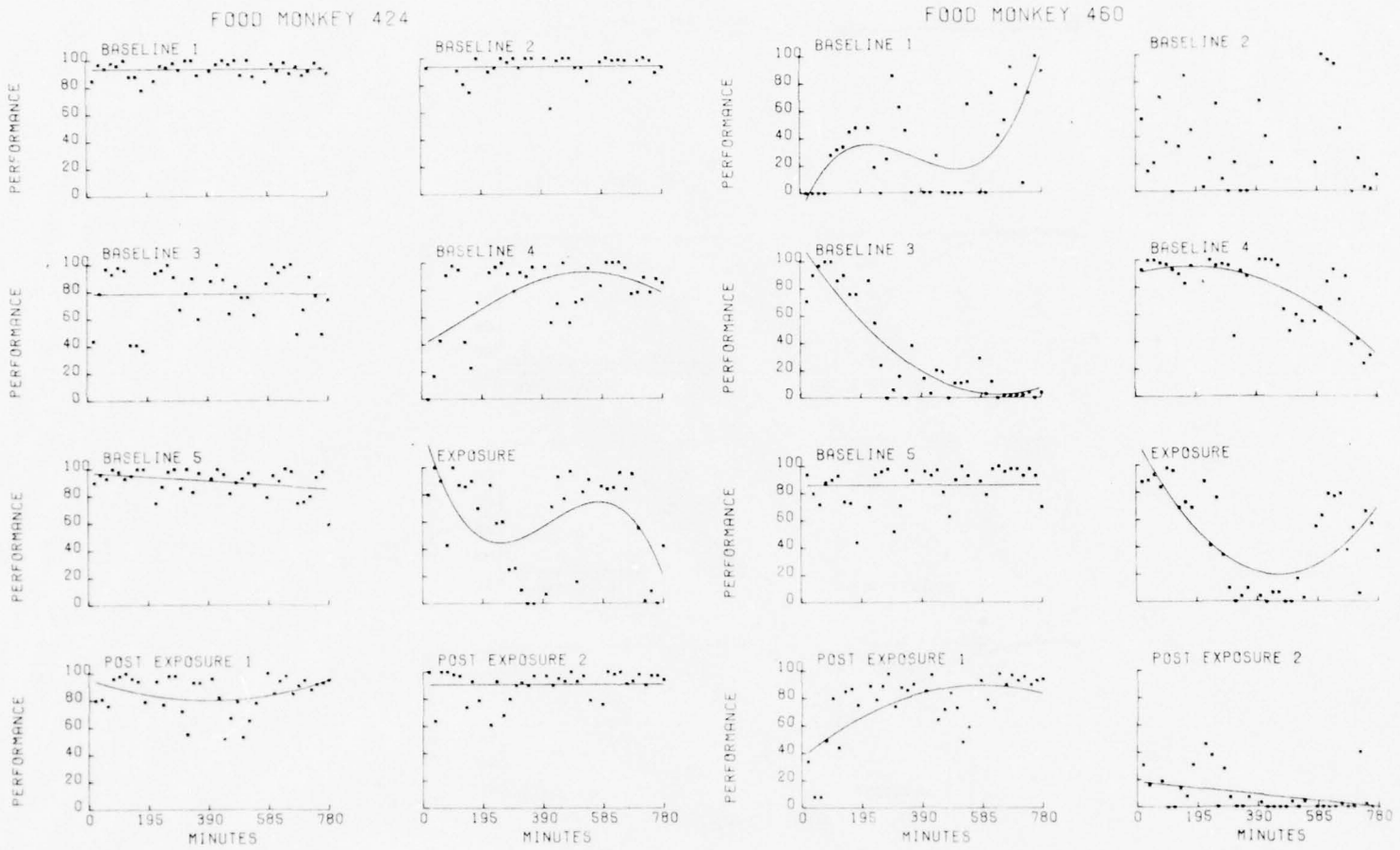
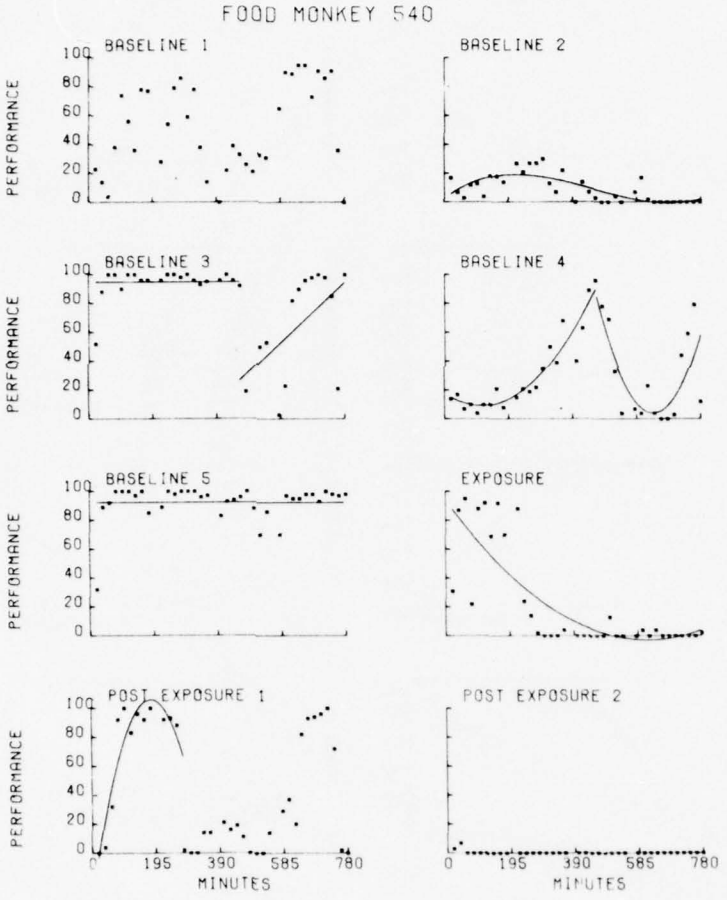
BASELINE 2
BASELINE 3
BASELINE 4
BASELINE 5
EXPOSURE
POST EXPOSURE 1
POST EXPOSURE 2
PERFORMANCE
MINUTES
0
195
390
585
780
20
40
60
80
100


FOOD MONKEY 410
FOOD MONKEY 418
BASELINE 1
BASELINE 2
BASELINE 3
BASELINE 4
BASELINE 5
EXPOSURE
POST EXPOSURE 1
POST EXPOSURE 2
PERFORMANCE
MINUTES
0
195
390
585
780
20
40
60
80
100


FOOD MONKEY 424
FOOD MONKEY 460
BASELINE 1
BASELINE 2
BASELINE 3
BASELINE 4
BASELINE 5
EXPOSURE
POST EXPOSURE 1
POST EXPOSURE 2
PERFORMANCE
MINUTES
0
195
390
585
780
20
40
60
80
100


FOOD MONKEY 540
BASELINE 1
BASELINE 2
BASELINE 3
BASELINE 4
BASELINE 5
EXPOSURE
POST EXPOSURE 1
POST EXPOSURE 2
PERFORMANCE
100
80
60
40
20
0
0
195
390
585
780
MINUTES

APPENDIX D

PERFORMANCE AND REACTION-TIME DATA

Performance scores (percent correct response and average reaction time for a correct response) are given for each 20-minute interval. At times 200, 380, and 560, blanks and stars represent rest periods; elsewhere they represent missing data or failure of the subject to respond within 1 second.

SHOCK MONKEY 54

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	100	100	100	100	100	97	100	100
40	100	100	100	100	100	100	100	100
60	100	100	100	100	100	100	100	100
80	100	100	100	100	100	97	98	98
100	100	100	98	100	100	100	100	100
120	100	97	100	100	100	100	100	100
140	100	100	100	100	100	100	100	100
160	100	100	100	97	100	96	100	100
180	100	100	100	100	100	100	100	100
200								
220	100	100	100	100	100	100	100	100
240	100	100	100	100	100	100	100	100
260	100	98	100	100	100	100	100	100
280	100	100	100	100	100	98	100	100
300	100	100	100	96	100	98	100	97
320	100	100	100	96	100	100	100	97
340	100	97	100	100	100	97	100	97
360	100	100	100	100	100	100	100	100
380								
400	100	100	100	92	100	100	100	100
420	100	96	100	100	100	100	100	100
440	100	100	100	100	100	93	100	100
460	100	100	100	100	100	100	100	97
480	100	96	100	100	100	100	100	100
500	100	100		96	100	100	97	97
520	100	100	100	100	100	96	96	100
540	100	97	100	100	100	100	100	100
560								
580	100	100	100	93	100	100	100	94
600	100	100	100	97	100	100	100	95
620	100	100	100	100	100	100	100	98
640	100	100	100	98	100	100	100	100
660	100	100	100	100	100	100	100	96
680	100	100	100	100	100	100	100	100
700	100	100	100	100	98	98	100	100
720	100	100	100	100	100	98	100	100
740	100	100	100	100	100	100	100	98
760	100	100	100	100	100	100	100	98
780	100	100	100	100	100	100	100	100

SHOCK MONKEY 54

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.48	0.42	0.42	0.52	0.43	0.39	0.50	0.44
40	0.58	0.46	0.48	0.40	0.46	0.39	0.57	0.47
60	0.48	0.52	0.44	0.47	0.47	0.38	0.46	0.46
80	0.52	0.54	0.41	0.44	0.46	0.39	0.44	0.44
100	0.51	0.54	0.45	0.46	0.48	0.41	0.41	0.47
120	0.52	0.57	0.43	0.47	0.43	0.39	0.48	0.53
140	0.61	0.53	0.50	0.48	0.52	0.43	0.42	0.50
160	0.50	0.61	0.48	0.43	0.54	0.41	0.45	0.57
180	0.55	0.57	0.42	0.46	0.48	0.39	0.44	0.50
200	****	****	****	****	****	****	****	****
220	0.61	0.59	0.41	0.45	0.55	0.37	0.45	0.55
240	0.52	0.59	0.46	0.47	0.48	0.41	0.47	0.62
260	0.56	0.52	0.40	0.41	0.45	0.44	0.43	0.65
280	0.52	0.53	0.43	0.46	0.48	0.50	0.52	0.61
300	0.59	0.53	0.48	0.48	0.52	0.50	0.56	0.66
320	0.53	0.58	0.48	0.44	0.46	0.52	0.52	0.64
340	0.68	0.68	0.50	0.42	0.52	0.54	0.52	0.69
360	0.69	0.59	0.48	0.43	0.50	0.52	0.55	0.71
380	****	****	****	****	****	****	****	****
400	0.59	0.65	0.49	0.49	0.54	0.53	0.52	0.59
420	0.53	0.56	0.46	0.37	0.46	0.57	0.52	0.61
440	0.50	0.61	0.41	0.41	0.52	0.54	0.52	0.62
460	0.59	0.62	0.52	0.43	0.50	0.57	0.52	0.59
480	0.53	0.55	0.56	0.42	0.53	0.60	0.46	0.63
500	0.62	0.55	****	0.42	0.53	0.53	0.50	0.64
520	0.60	0.57	0.48	0.41	0.53	0.56	0.48	0.57
540	0.52	0.52	0.52	0.48	0.52	0.50	0.47	0.64
560	****	****	****	****	****	****	****	****
580	0.52	0.49	0.56	0.48	0.46	0.52	0.52	0.55
600	0.50	0.48	0.57	0.43	0.47	0.57	0.44	0.56
620	0.52	0.48	0.54	0.44	0.50	0.52	0.42	0.48
640	0.54	0.48	0.50	0.43	0.49	0.56	0.45	0.52
660	0.54	0.48	0.53	0.45	0.51	0.50	0.43	0.53
680	0.56	0.47	0.51	0.43	0.49	0.57	0.46	0.52
700	0.56	0.51	0.53	0.51	0.54	0.58	0.47	0.55
720	0.59	0.41	0.64	0.45	0.59	0.53	0.47	0.53
740	0.60	0.55	0.61	0.40	0.58	0.57	0.51	0.54
760	0.70	0.56	0.66	0.40	0.53	0.62	0.54	0.52
780	0.69	0.56	0.71	0.43	0.57	0.56	0.50	0.58

SHOCK MONKEY 92

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	97	100	97	100	100	91	100	100
40	100	93	100	96	100	100	96	100
60	100	97	100	100	100	100	100	100
80	100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100	100
120	100	100	100	100	100	100	100	97
140	100	100	100	100	100	100	100	100
160	100	100	100	100	100	97	100	100
180	100	100	100	100	100	100	100	100
200								
220	100	93	100	100	100	97	100	100
240	100	96	100	100	100	100	100	100
260	100	97	100	100	100	100	100	100
280	100	100	100	100	100	98	100	98
300	100	100	100	100	100	100	100	97
320	100	100	100	100	100	100	97	100
340	100	100	100	100	100	98	100	100
360	100	100	100	100	100	100	100	100
380								
400	100	100	100	100	100	100	97	100
420	100	100	100	100	100	100	100	97
440	100	100	100	100	100	100	100	96
460	100	100	100	100	100	100	100	100
480	96	100	96	100	97	100	100	100
500	100	100	100	100	97	96	100	100
520	100	100	100	100	100	100	100	100
540	100	96	100	100	100	100	100	100
560								
580	100	100	100	100	100	100	100	100
600	100	100	100	100	100	98	100	100
620	100	100	100	98	100	97	96	100
640	100	100	100	100	100	100	100	100
660	100	100	100	100	100	100	100	100
680	100	98	100	100	100	98	100	98
700	100	100	100	98	100	98	100	100
720	100	98	100	100	100	100	100	100
740	100	98	100	97	100	100	97	100
760	100	100	100	100	100	100	100	100
780	100	100	100	98	100	100	100	98

SHOCK MONKEY 92

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.56	0.52	0.47	0.44	0.43	0.43	0.42	0.41
40	0.60	0.56	0.45	0.41	0.45	0.41	0.46	0.46
60	0.50	0.57	0.42	0.39	0.52	0.45	0.41	0.43
80	0.54	0.52	0.48	0.42	0.48	0.43	0.45	0.45
100	0.49	0.51	0.43	0.42	0.48	0.43	0.50	0.47
120	0.41	0.47	0.45	0.46	0.46	0.41	0.46	0.41
140	0.46	0.47	0.43	0.48	0.55	0.41	0.50	0.45
160	0.52	0.46	0.48	0.46	0.53	0.41	0.52	0.42
180	0.50	0.59	0.45	0.50	0.54	0.45	0.52	0.46
200	****	****	****	****	****	****	****	****
220	0.50	0.59	0.48	0.45	0.52	0.48	0.50	0.47
240	0.47	0.58	0.44	0.52	0.52	0.54	0.50	0.48
260	0.59	0.53	0.43	0.48	0.52	0.51	0.51	0.41
280	0.56	0.59	0.46	0.46	0.54	0.51	0.52	0.45
300	0.58	0.57	0.43	0.52	0.52	0.52	0.54	0.41
320	0.54	0.58	0.50	0.50	0.54	0.53	0.48	0.41
340	0.50	0.61	0.54	0.52	0.54	0.54	0.52	0.40
360	0.63	0.59	0.54	0.50	0.56	0.55	0.48	0.43
380	****	****	****	****	****	****	****	****
400	0.58	0.57	0.53	0.54	0.54	0.63	0.50	0.43
420	0.62	0.58	0.53	0.45	0.52	0.50	0.48	0.41
440	0.52	0.59	0.57	0.63	0.53	0.48	0.54	0.42
460	0.67	0.62	0.52	0.42	0.59	0.53	0.50	0.41
480	0.64	0.52	0.59	0.44	0.59	0.45	0.48	0.46
500	0.56	0.52	0.52	0.48	0.55	0.52	0.55	0.42
520	0.60	0.48	0.56	0.52	0.57	0.48	0.48	0.48
540	0.45	0.48	0.59	0.52	0.60	0.46	0.52	0.42
560	****	****	****	****	****	****	****	****
580	0.53	0.52	0.58	0.52	0.63	0.48	0.48	0.48
600	0.55	0.63	0.68	0.52	0.55	0.47	0.54	0.44
620	0.55	0.50	0.66	0.48	0.60	0.44	0.50	0.49
640	0.62	0.53	0.71	0.52	0.54	0.42	0.53	0.51
660	0.61	0.64	0.79	0.56	0.57	0.49	0.54	0.51
680	0.59	0.65	0.73	0.59	0.60	0.51	0.57	0.51
700	0.62	0.63	0.78	0.57	0.57	0.47	0.57	0.56
720	0.58	0.65	0.82	0.52	0.64	0.46	0.59	0.57
740	0.67	0.63	0.80	0.59	0.62	0.48	0.54	0.59
760	0.74	0.60	0.81	0.56	0.61	0.53	0.56	0.56
780	0.60	0.59	0.70	0.61	0.58	0.54	0.61	0.60

SHOCK MONKEY 134

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	100	94	100	100	96	100	100	100
40	100	95	100	100	100	100	100	100
60	100	100	100	100	100	100	100	100
80	100	100	100	100	100	100	100	100
100	100	100	100	100	100	96	100	100
120	100	96	100	100	100	100	100	100
140	100	100	100	97	100	100	100	100
160	100	100	100	100	100	100	100	100
180	100	100	100	96	100	100	100	100
200								
220	96	100	100	100	100	93	100	100
240	100	100	100	100	100	100	100	100
260	98	100	100	98	100	100	98	100
280	100	100		100	100	98	100	98
300	100	100	100	100	100	96	100	100
320	100	100	100	100	100	100	100	100
340	100	100	100	100	100	96	100	100
360	94	100	100	100	100	100	100	100
380								
400	100	100	100	100	100	100	100	100
420	96	100	97	100	100	100	100	100
440	96	89	100	97	96	96	100	100
460	100	100	100	100	100	93	100	100
480	100	96	100	100	100	100	100	100
500	100	100	96	97	100	100	96	96
520	100	100	100	100	100	100	100	100
540	100	100	97	100	100	97	100	96
560								
580	100	100	100	93	100	96	100	97
600	100	100	97	100	100	95	100	98
620	100	98	100	98	100	98	98	100
640	98	100	100	100	100	100	100	100
660	98	98	100	100	100	100	100	100
680	100	100	100	100	100	96	100	100
700	98	100	100	100	100	100	98	100
720	100	100	100	100	100	100	100	100
740	93	98	100	100	98	98	100	98
760	100	100	100	100	100	100	98	100
780	100	100	100	94	100	100	100	100

SHOCK MONKEY 134

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.31	0.35	0.33	0.32	0.32	0.39	0.35	0.37
40	0.32	0.33	0.35	0.35	0.31	0.45	0.37	0.36
60	0.33	0.34	0.38	0.36	0.35	0.48	0.36	0.40
80	0.36	0.37	0.37	0.32	0.31	0.42	0.34	0.38
100	0.47	0.34	0.38	0.37	0.33	0.45	0.36	0.40
120	0.34	0.33	0.43	0.36	0.34	0.39	0.37	0.33
140	0.36	0.32	0.39	0.36	0.31	0.43	0.38	0.38
160	0.33	0.34	0.36	0.35	0.35	0.44	0.36	0.41
180	0.38	0.36	0.43	0.42	0.33	0.45	0.39	0.38
200	****	****	****	****	****	****	****	****
220	0.34	0.33	0.43	0.40	0.35	0.48	0.39	0.37
240	0.35	0.36	0.40	0.36	0.40	0.48	0.41	0.38
260	0.41	0.36	0.40	0.41	0.34	0.48	0.40	0.37
280	0.39	0.36	****	0.37	0.35	0.48	0.38	0.40
300	0.38	0.39	0.41	0.38	0.37	0.48	0.40	0.38
320	0.40	0.38	0.40	0.40	0.40	0.50	0.42	0.39
340	0.39	0.40	0.48	0.40	0.35	0.54	0.40	0.43
360	0.39	0.38	0.46	0.41	0.38	0.52	0.41	0.40
380	****	****	****	****	****	****	****	****
400	0.36	0.39	0.48	0.47	0.35	0.52	0.32	0.37
420	0.39	0.41	0.43	0.41	0.41	0.50	0.41	0.42
440	0.33	0.40	0.39	0.45	0.44	0.54	0.42	0.40
460	0.41	0.34	0.32	0.42	0.42	0.48	0.45	0.39
480	0.37	0.38	0.34	0.46	0.41	0.47	0.43	0.42
500	0.33	0.35	0.38	0.50	0.39	0.48	0.48	0.39
520	0.43	0.41	0.35	0.47	0.41	0.47	0.43	0.38
540	0.40	0.41	0.34	0.50	0.48	0.57	0.45	0.41
560	****	****	****	****	****	****	****	****
580	0.39	0.39	0.37	0.43	0.41	0.48	0.37	0.42
600	0.45	0.42	0.39	0.42	0.40	0.47	0.40	0.42
620	0.41	0.37	0.35	0.38	0.40	0.42	0.40	0.37
640	0.40	0.39	0.31	0.33	0.40	0.39	0.41	0.38
660	0.39	0.39	0.36	0.35	0.43	0.47	0.42	0.39
680	0.40	0.40	0.36	0.35	0.43	0.47	0.43	0.41
700	0.38	0.37	0.37	0.37	0.40	0.45	0.44	0.41
720	0.38	0.41	0.38	0.40	0.45	0.47	0.41	0.44
740	0.44	0.43	0.40	0.47	0.41	0.48	0.43	0.42
760	0.39	0.38	0.43	0.51	0.41	0.51	0.44	0.43
780	0.42	0.37	0.45	0.42	0.44	0.41	0.42	0.44

SHOCK MONKEY 446

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	97	99	100	97	100	100	100	100
40	98	100	100	100	100	95	100	100
60	100	100	96	100	100	92	100	100
80	100	100	100	100	98	100	96	100
100	100	100	100	100	96	100	100	96
120	100	100	100	100	96	100	96	95
140	97	97	100	100	97	96	100	100
160	100	96	100	100	88	92	96	92
180	100	100	91	100	100	100	100	96
200								
220	97	100	100	100	100	96	100	100
240	98	100	100	97	100	100	100	100
260	98	100	100	100	100	100	100	98
280	95	96	90	100	98	98	100	98
300	98	100	96	90	96	97	100	100
320	100	96	100	100	100	100	100	100
340	93	100	100	100	100	97	96	96
360	93	92	100	100	100	96	100	96
380								
400	91	100	100	90	100	100	97	92
420	93	96	96	89	100	97	100	100
440	97	100	100	93	100	100	96	100
460	98	100	96	96	96	96	100	100
480	93	100	84	88	100	97	97	100
500	97	96	100	86	100	97	100	96
520	98	95	100	90	100	97	94	100
540	98	100	100	96	96	100	100	100
560								
580	95	100	100	97	100	100	100	100
600	98	97	98	93	97	100	100	100
620	100	97	98	88	94	98	96	96
640	100	96	100	95	100	97	98	98
660	98	100	98	95	98	96	100	98
680	98	100	98	98	100	100	100	100
700	98	100	98	96	98	96	98	100
720	96	98	98	93	100	98	95	100
740		100	100	97	100	98	98	98
760		95	100	93	98	96	100	100
780		98	100	98	100	98	95	98

SHOCK MONKEY 446

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.39	0.41	0.50	0.46	0.53	0.50	0.44	0.48
40	0.45	0.48	0.56	0.56	0.41	0.50	0.48	0.57
60	0.45	0.50	0.60	0.58	0.50	0.46	0.48	0.64
80	0.43	0.47	0.59	0.53	0.47	0.49	0.48	0.64
100	0.45	0.52	0.45	0.54	0.47	0.49	0.51	0.71
120	0.43	0.50	0.57	0.54	0.52	0.48	0.44	0.68
140	0.43	0.51	0.67	0.55	0.46	0.50	0.41	0.60
160	0.46	0.53	0.67	0.64	0.55	0.54	0.50	0.61
180	0.52	0.57	0.59	0.52	0.50	0.48	0.53	0.50
200	****	****	****	****	****	****	****	****
220	0.47	0.53	0.46	0.52	0.46	0.50	0.54	0.53
240	0.45	0.50	0.54	0.59	0.52	0.60	0.57	0.52
260	0.44	0.54	0.59	0.61	0.49	0.65	0.55	0.58
280	0.45	0.56	0.56	0.63	0.54	0.66	0.59	0.57
300	0.48	0.60	0.55	0.63	0.54	0.66	0.62	0.61
320	0.49	0.55	0.60	0.61	0.52	0.71	0.58	0.63
340	0.46	0.58	0.63	0.59	0.52	0.61	0.59	0.61
360	0.49	0.60	0.63	0.59	0.50	0.67	0.56	0.67
380	****	****	****	****	****	****	****	****
400	0.48	0.45	0.56	0.54	0.53	0.63	0.55	0.57
420	0.52	0.54	0.52	0.54	0.53	0.61	0.60	0.57
440	0.57	0.54	0.53	0.59	0.55	0.54	0.54	0.59
460	0.47	0.54	0.57	0.52	0.50	0.65	0.59	0.61
480	0.54	0.47	0.55	0.61	0.56	0.61	0.57	0.56
500	0.53	0.55	0.57	0.60	0.50	0.68	0.59	0.68
520	0.53	0.55	0.61	0.56	0.52	0.57	0.52	0.53
540	0.54	0.57	0.60	0.59	0.54	0.67	0.59	0.64
560	****	****	****	****	****	****	****	****
580	0.50	0.55	0.56	0.61	0.50	0.58	0.52	0.50
600	0.48	0.53	0.57	0.61	0.53	0.64	0.54	0.58
620	0.50	0.54	0.58	0.57	0.49	0.60	0.60	0.62
640	0.58	0.56	0.66	0.60	0.57	0.61	0.58	0.63
660	0.56	0.55	0.56	0.55	0.47	0.61	0.59	0.57
680	0.55	0.59	0.66	0.61	0.53	0.65	0.57	0.58
700	0.62	0.58	0.59	0.63	0.60	0.61	0.64	0.62
720	0.63	0.61	0.56	0.57	0.59	0.68	0.63	0.65
740	****	0.54	0.60	0.63	0.62	0.67	0.63	0.64
760	****	0.68	0.61	0.66	0.61	0.69	0.65	0.66
780	****	0.65	0.58	0.60	0.60	0.69	0.62	0.72

SHOCK MONKEY 454

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	100	96	96	96	100	100	100	100
40	100	88	95	100	100	100	100	100
60	100	100	100	100	100	93	100	100
80	100	100	95	98	100	98	96	100
100	100	100	100	98	100	100	100	100
120	100	100	96	100	100	100	100	100
140	100	100	100	100	100	97	100	100
160	100	100	100	100	100	100	96	96
180	100	96	97	100	100	96	100	97
200								
220	100	100	97	100	100	100	96	100
240	96	100	93	100	100	96	92	100
260	98	100	96	100	100	94	100	98
280	100	98	97	100	100	98	98	100
300	100	100	96	100	100	94	92	100
320	100	100	96	100	100	93	92	100
340	97	100	93	100	100	74	100	100
360	100	100	96	96	100	89	100	100
380								
400	100	96	100	100	100	84	100	100
420	100	96	96	100	96	90	93	100
440	100	97	97	100	100	86	90	100
460	100	94	100	100	96	92	100	96
480	100	93	93	100	100	96	93	97
500	100	100	100	100	96	84	89	96
520	100	97	97	100	100	92	96	100
540	97	100	100	100	96	93	92	100
560								
580	97	96	100	97	100	81	100	100
600	100	96	92	100	100	96	100	100
620	100	98	100	100	96	96	98	100
640	100	100	97	100	100	90	96	96
660	98	100	96	100	100	91	98	96
680	100	96	98	100	100	80	100	96
700	100	98	97	98	98	88	96	100
720	100	100	96	98	100	88	100	96
740	100	100	100	100	100	90	100	98
760	100	100	100	100	98	94	93	100
780	98	98	98	98	96	84	98	98

SHOCK MONKEY 454

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.39	0.64	0.48	0.52	0.41	0.48	0.52	0.43
40	0.45	0.55	0.50	0.50	0.41	0.52	0.53	0.45
60	0.48	0.46	0.48	0.55	0.47	0.48	0.50	0.40
80	0.47	0.44	0.51	0.51	0.44	0.53	0.51	0.45
100	0.47	0.43	0.59	0.46	0.44	0.51	0.58	0.51
120	0.45	0.50	0.56	0.48	0.45	0.52	0.53	0.46
140	0.48	0.48	0.55	0.46	0.42	0.57	0.56	0.52
160	0.46	0.50	0.52	0.50	0.46	0.64	0.60	0.50
180	0.48	0.50	0.55	0.50	0.47	0.67	0.63	0.50
200	****	****	****	****	****	****	****	****
220	0.48	0.55	0.61	0.45	0.46	0.67	0.66	0.40
240	0.50	0.55	0.56	0.52	0.48	0.65	0.58	0.46
260	0.41	0.49	0.58	0.49	0.45	0.63	0.64	0.48
280	0.42	0.45	0.57	0.53	0.47	0.69	0.73	0.49
300	0.46	0.52	0.56	0.55	0.43	0.67	0.73	0.48
320	0.46	0.55	0.63	0.53	0.50	0.71	0.65	0.50
340	0.61	0.52	0.59	0.55	0.48	0.65	0.69	0.52
360	0.45	0.52	0.52	0.52	0.52	0.68	0.69	0.58
380	****	****	****	****	****	****	****	****
400	0.43	0.56	0.54	0.52	0.52	0.69	0.69	0.47
420	0.42	0.58	0.52	0.48	0.50	0.73	0.63	0.47
440	0.40	0.57	0.54	0.48	0.59	0.69	0.69	0.52
460	0.45	0.48	0.59	0.41	0.52	0.72	0.67	0.48
480	0.48	0.50	0.54	0.47	0.55	0.72	0.67	0.57
500	0.43	0.57	0.57	0.52	0.54	0.77	0.69	0.58
520	0.41	0.50	0.54	0.56	0.48	0.75	0.61	0.64
540	0.40	0.54	0.56	0.48	0.50	0.78	0.63	0.63
560	****	****	****	****	****	****	****	****
580	0.41	0.50	0.48	0.52	0.57	0.73	0.53	0.67
600	0.40	0.52	0.61	0.48	0.48	0.70	0.52	0.73
620	0.44	0.46	0.58	0.48	0.45	0.75	0.54	0.66
640	0.44	0.52	0.63	0.47	0.51	0.78	0.61	0.67
660	0.43	0.51	0.63	0.67	0.44	0.78	0.58	0.51
680	0.39	0.54	0.55	0.49	0.53	0.77	0.58	0.49
700	0.39	0.50	0.59	0.47	0.51	0.72	0.67	0.50
720	0.40	0.50	0.64	0.47	0.48	0.78	0.66	0.49
740	0.46	0.49	0.55	0.52	0.44	0.74	0.65	0.55
760	0.47	0.49	0.63	0.52	0.44	0.70	0.77	0.62
780	0.48	0.51	0.61	0.53	0.44	0.65	0.73	0.68

SHOCK MONKEY 468

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	100	100	96	100	78	100	100	100
40	100	100	100	100	93	93	100	100
60	100	100	100	100	92	93	100	100
80	98	98	100	100	94	100	100	100
100	100	98	100	100	96	100	98	100
120	100	95	100	100	97	96	96	100
140	100	100	100	100	100	88	97	100
160	96	96	100	96	100	97	96	100
180	100	100	100	100	92	93	100	100
200								
220	100	100	100	100	93	92	93	100
240	100	100	100	100	90	92	100	100
260	96	98	97	100	96	88	98	100
280	97	93	100	100	95	91	96	100
300	97	94	93	96	90	79	100	100
320	97	96	93	100	92	97	93	100
340	100	97	94	100	93	91	96	100
360	100	100	94	100	92	76	100	100
380								
400	97	94	93	100	93	84	89	100
420	96	97	97	100	88	79	90	100
440	100	100	100	96	90	52	96	100
460	97	89	100	100	91	50	90	100
480	100	100	97	100	85	63	96	100
500	93	93	100	100	82	48	96	100
520	96	100	97	100	88	50	96	100
540	96	93	96	100	83	48	92	100
560								
580	100	94	100	100	80	61	92	100
600	92	90	100	96	80	64	96	100
620	98	98	100	100	87	74	92	98
640	91	97	100	100	82	80	92	98
660	96	100	98	100	86	80	98	98
680	100	96	100	100	90	74	92	98
700	100	100	100	98	85	76	90	98
720	100	100	97	100	92	98	93	98
740	98	98	100	100	92	61	98	94
760	98	100	100	100	88	66	90	100
780	100	100	95	100	78	64	100	100

SHOCK MONKEY 468

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.46	0.45	0.42	0.43	0.54	0.47	0.47	0.41
40	0.37	0.50	0.33	0.43	0.52	0.58	0.57	0.43
60	0.48	0.48	0.55	0.52	0.54	0.58	0.57	0.47
80	0.53	0.51	0.53	0.52	0.57	0.62	0.58	0.43
100	0.53	0.49	0.54	0.46	0.55	0.59	0.70	0.40
120	0.54	0.53	0.60	0.50	0.53	0.60	0.67	0.41
140	0.57	0.59	0.56	0.47	0.55	0.59	0.63	0.42
160	0.57	0.56	0.66	0.43	0.59	0.62	0.73	0.45
180	0.60	0.59	0.53	0.47	0.60	0.63	0.63	0.43
200	****	****	****	****	****	****	****	****
220	0.61	0.60	0.60	0.52	0.59	0.63	0.68	0.47
240	0.58	0.57	0.58	0.50	0.61	0.71	0.69	0.42
260	0.56	0.59	0.53	0.51	0.65	0.74	0.61	0.49
280	0.61	0.57	0.59	0.50	0.67	0.76	0.65	0.46
300	0.59	0.58	0.57	0.50	0.67	0.70	0.71	0.48
320	0.55	0.59	0.69	0.48	0.72	0.71	0.68	0.52
340	0.53	0.58	0.62	0.48	0.68	0.70	0.68	0.48
360	0.62	0.58	0.72	0.48	0.68	0.77	0.65	0.51
380	****	****	****	****	****	****	****	****
400	0.61	0.60	0.58	0.45	0.71	0.73	0.68	0.48
420	0.58	0.61	0.64	0.46	0.75	0.78	0.70	0.46
440	0.64	0.58	0.65	0.42	0.70	0.69	0.75	0.52
460	0.61	0.67	0.68	0.48	0.71	0.71	0.74	0.54
480	0.64	0.62	0.66	0.50	0.74	0.79	0.67	0.53
500	0.66	0.59	0.71	0.50	0.79	0.75	0.72	0.55
520	0.63	0.59	0.66	0.52	0.73	0.69	0.74	0.56
540	0.63	0.63	0.73	0.44	0.85	0.64	0.72	0.52
560	****	****	****	****	****	****	****	****
580	0.66	0.62	0.64	0.48	0.76	0.74	0.73	0.54
600	0.65	0.64	0.70	0.50	0.79	0.81	0.71	0.55
620	0.65	0.60	0.63	0.46	0.77	0.74	0.73	0.56
640	0.67	0.62	0.69	0.49	0.79	0.74	0.66	0.55
660	0.67	0.61	0.74	0.50	0.74	0.74	0.71	0.58
680	0.68	0.53	0.69	0.53	0.67	0.71	0.61	0.55
700	0.59	0.56	0.80	0.53	0.66	0.67	0.73	0.59
720	0.62	0.57	0.68	0.52	0.80	0.79	0.67	0.62
740	0.66	0.60	0.65	0.54	0.71	0.33	0.65	0.65
760	0.72	0.67	0.68	0.55	0.75	0.28	0.67	0.62
780	0.67	0.64	0.69	0.55	0.77	0.27	0.71	0.63

SHOCK MONKEY 490

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	92	96	100	97	100	98	100	100
40	100	96	100	100	100	100	100	100
60	100	100	100	100	100	96	100	100
80	100	98	100	100	100	97	100	100
100	100	100	100	100	100	100	100	100
120	100	100	100	100	100	100	100	100
140	100	100	100	97	100	100	100	100
160	100	100	100	100	100	100	100	97
180	100	100	100	100	100	100	100	96
200								
220	100	100	100	100	100	100	100	100
240	100	100	100	100	100	100	100	100
260	100	97	100	100	100	97	98	98
280	100	100	100	100	100	100	98	100
300	100	100	100	100	100	100	100	100
320	100	100	100	100	97	100	100	100
340	100	100	100	96	100	100	100	96
360	100	100	100	97	100	100	100	100
380								
400	100	100	100	100	100	100	100	100
420	100	100	100	96	100	100	100	97
440	100	100	100	100	100	100	100	100
460	100	100	100	100	100	100	100	100
480	100	100	100	100	100	100	100	100
500	100	100	100	100	100	100	100	100
520	100	100	97	100	100	100	100	100
540	100	100	100	100	100	100	96	100
560								
580	100	100	100	100	100	97	100	100
600	100	100	100	100	100	100	100	97
620	100	100	100	100	100	100	100	100
640	100	100	100	100	100	98	98	98
660	100	98	100	100	100	100	96	100
680	100	100	100	100	100	100	100	100
700	100	100	100	98	98	100	97	100
720	100	100	100	100	98	98	98	100
740	100	100	100	98	100	100	96	97
760	100	100	100	98	98	98	100	100
780	100	100	100	100	100	100	100	100

SHOCK MONKEY 490

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.80	0.65	0.70	0.64	0.79	0.51	0.52	0.47
40	0.69	0.65	0.62	0.62	0.59	0.46	0.58	0.55
60	0.74	0.60	0.71	0.60	0.65	0.44	0.53	0.48
80	0.86	0.67	0.81	0.55	0.69	0.57	0.57	0.52
100	0.84	0.65	0.86	0.57	0.64	0.49	0.56	0.54
120	0.84	0.55	0.71	0.55	0.70	0.50	0.54	0.54
140	0.79	0.61	0.74	0.59	0.67	0.48	0.57	0.53
160	0.95	0.55	0.90	0.56	0.70	0.55	0.55	0.55
180	0.81	0.60	0.79	0.55	0.70	0.54	0.59	0.52
200	****	****	****	****	****	****	****	****
220	0.77	0.58	0.63	0.55	0.75	0.42	0.52	0.55
240	0.87	0.59	0.68	0.61	0.76	0.53	0.59	0.58
260	0.97	0.57	0.81	0.59	0.84	0.53	0.66	0.56
280	0.87	0.52	0.79	0.58	0.72	0.53	0.66	0.55
300	0.85	0.55	0.73	0.61	0.79	0.54	0.62	0.57
320	0.93	0.52	0.73	0.62	0.75	0.53	0.66	0.57
340	0.97	0.48	0.73	0.59	0.74	0.52	0.65	0.56
360	0.97	0.48	0.83	0.54	0.67	0.54	0.63	0.58
380	****	****	****	****	****	****	****	****
400	0.97	0.45	0.65	0.55	0.71	0.57	0.67	0.57
420	0.87	0.55	0.70	0.60	0.67	0.55	0.68	0.61
440	0.75	0.60	0.73	0.57	0.67	0.52	0.68	0.59
460	0.89	0.48	0.74	0.53	0.77	0.56	0.60	0.57
480	0.88	0.50	0.81	0.55	0.74	0.53	0.59	0.54
500	0.82	0.57	0.97	0.60	0.72	0.67	0.66	0.54
520	0.86	0.57	0.90	0.54	0.73	0.63	0.62	0.61
540	0.90	0.53	0.83	0.59	0.84	0.59	0.68	0.59
560	****	****	****	****	****	****	****	****
580	0.77	0.45	0.70	0.56	0.76	0.50	0.60	0.59
600	0.81	0.48	0.86	0.50	0.71	0.63	0.67	0.55
620	0.82	0.49	0.74	0.51	0.75	0.44	0.63	0.49
640	0.91	0.52	0.78	0.56	0.69	0.58	0.60	0.46
660	0.88	0.49	0.69	0.54	0.83	0.57	0.55	0.46
680	0.84	0.35	0.75	0.61	0.83	0.60	0.59	0.52
700	0.85	0.55	0.75	0.68	0.78	0.59	0.59	0.60
720	0.95	0.55	0.85	0.60	0.77	0.63	0.62	0.59
740	0.88	0.54	0.72	0.60	0.81	0.67	0.59	0.63
760	0.84	0.56	0.78	0.57	0.76	0.64	0.56	0.61
780	0.96	0.58	0.82	0.53	0.83	0.56	0.55	0.59

SHOCK MONKEY 504

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	100	100	100	100	100	100	100	100
40	100	100	96	100	100	97	100	100
60	100	100	100	100	100	96	100	100
80	100	100	100	100	100	100	100	100
100	100	100	100	100	100	97	100	100
120	100	100	100	100	100	96	100	100
140	100	100	100	100	97	100	100	100
160	100	100	100	100	100	100	100	100
180	97	100	100	100	100	100	100	96
200								
220	100	97	97	100	100	100	100	100
240	100	100	100	100	100	100	100	100
260	100	100	98	100	100	100	100	100
280	100	100	100	100	100	100	100	100
300	100	100	100	100	100	96	100	100
320	100	100	100	100	100	100	100	100
340	100	100	100	100	100	100	100	100
360	100	100	100	100	100	100	100	93
380								
400	100	100	100	100	100	97	100	100
420	100	100	100	100	100	96	100	97
440	100	100	95	100	100	100	93	96
460	100	100	100	100	100	100	96	100
480	100	100	100	100	100	100	92	100
500	100	100	100	100	100	100	100	100
520	100	100	100	100	100	100	100	100
540	100	100	96	100	100	100	100	100
560								
580	100	100	97	100	90	100	100	97
600	100	100	100	100	96	96	100	97
620	100	100	100	100	100	100	100	100
640	100	100	100	100	100	100	100	100
660	98	100	100	100	100	100	100	100
680	100	100	100	100	100	96	98	97
700	100	100	100	100	100	100	95	100
720	100	100	100	100	98	100	98	96
740	98	100	96	100	98	100	93	96
760	100	100	100	100	97	98	97	97
780	100	100	98	100	100	100	96	100

SHOCK MONKEY 504

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.44	0.48	0.43	0.44	0.60	0.41	0.43	0.41
40	0.46	0.52	0.48	0.46	0.47	0.45	0.48	0.42
60	0.43	0.49	0.47	0.46	0.48	0.42	0.48	0.45
80	0.44	0.48	0.47	0.47	0.49	0.42	0.46	0.44
100	0.49	0.50	0.55	0.48	0.49	0.44	0.49	0.47
120	0.45	0.59	0.54	0.50	0.52	0.39	0.48	0.48
140	0.52	0.58	0.52	0.54	0.53	0.42	0.52	0.52
160	0.46	0.62	0.56	0.55	0.48	0.42	0.50	0.48
180	0.50	0.63	0.52	0.52	0.52	0.44	0.52	0.48
200	****	****	****	****	****	****	****	****
220	0.49	0.50	0.53	0.52	0.55	0.43	0.46	0.50
240	0.48	0.48	0.52	0.52	0.50	0.45	0.48	0.48
260	0.47	0.45	0.51	0.52	0.53	0.42	0.45	0.44
280	0.48	0.49	0.50	0.54	0.53	0.45	0.48	0.51
300	0.54	0.45	0.57	0.63	0.54	0.43	0.54	0.55
320	0.52	0.48	0.48	0.57	0.59	0.44	0.56	0.46
340	0.48	0.52	0.47	0.59	0.54	0.43	0.52	0.54
360	0.54	0.46	0.45	0.55	0.57	0.50	0.53	0.44
380	****	****	****	****	****	****	****	****
400	0.47	0.44	0.48	0.53	0.55	0.42	0.48	0.55
420	0.48	0.46	0.57	0.57	0.59	0.44	0.47	0.45
440	0.50	0.52	0.50	0.52	0.59	0.48	0.70	0.48
460	0.48	0.50	0.57	0.59	0.64	0.48	0.54	0.50
480	0.53	0.55	0.53	0.56	0.59	0.45	0.61	0.50
500	0.47	0.52	0.53	0.55	0.59	0.55	0.50	0.52
520	0.54	0.56	0.57	0.53	0.58	0.50	0.52	0.48
540	0.53	0.48	0.50	0.60	0.52	0.50	0.53	0.50
560	****	****	****	****	****	****	****	****
580	0.48	0.66	0.53	0.55	0.50	0.54	0.56	0.55
600	0.46	0.57	0.50	0.58	0.48	0.48	0.62	0.52
620	0.44	0.50	0.47	0.59	0.50	0.50	0.54	0.52
640	0.52	0.52	0.51	0.62	0.51	0.51	0.60	0.53
660	0.51	0.52	0.50	0.57	0.53	0.55	0.51	0.54
680	0.51	0.60	0.49	0.56	0.56	0.47	0.53	0.54
700	0.52	0.59	0.52	0.62	0.59	0.51	0.49	0.53
720	0.53	0.58	0.54	0.60	0.57	0.53	0.55	0.54
740	0.52	0.63	0.52	0.67	0.56	0.53	0.53	0.56
760	0.51	0.66	0.51	0.73	0.53	0.58	0.59	0.57
780	0.50	0.63	0.61	0.73	0.53	0.52	0.58	0.54

FOOD MONKEY 50

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	26	97	100	100	46	78	96	100
40	23	96	83	100	93	100	47	100
60	48	100	93	96	97	89	13	100
80	44	93	65	100	100	96	99	93
100	90	93	30	100	98	98	77	100
120	76	93	83	100	95	100	7	86
140	48	85	97	83	52	87	43	100
160	90	96	81	82	100	100	74	100
180	32	97	81	100	73	90	77	97
200								
220	62	94	100	100	90	30	90	100
240	86	97	96	97	80	0	92	97
260	94	93	92	100	98	4	77	88
280	93	100	98	96	100	4	98	96
300	76	97	93	100	97	0	97	97
320	92	95	96	100	87	0	89	97
340	40	97	100	100	40	0	59	100
360	63	100	97	97	100	0	100	96
380								
400	21	96	88	92	57	3	96	89
420	68	100	96	86	92	0	97	68
440	64	100	77	97	83	15	94	89
460	72	100	100	90	100	0	90	100
480	21	96	96	100	65	7	97	89
500	25	100	97	100	64	3		97
520		100	89	97	96	3	96	100
540	85	100	92	62	92	3	92	97
560								
580	81	100	93	100	46	20	97	100
600	59	93	100	97	96	0	59	100
620	48	100	100	96	72	2	93	96
640	96	93	96	100	72	3	86	96
660	61	100	87	98	92	0	80	96
680	69	100	83	96	56	0	100	98
700	84	100	48	75	98	2	55	75
720	62	97	92	95	64	0	78	60
740	60	94	70	96	84	0	66	98
760	57	100	85	93	90	0	79	92
780	61	68	40	15	73	0	65	93

FOOD MONKEY 50

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.67	0.48	0.57	0.56	0.46	0.50	0.52	0.44
40	0.80	0.50	0.60	0.52	0.56	0.50	0.64	0.46
60	0.56	0.52	0.60	0.48	0.50	0.48	0.50	0.44
80	0.64	0.49	0.62	0.50	0.50	0.44	0.53	0.51
100	0.58	0.45	0.53	0.47	0.48	0.47	0.60	0.43
120	0.58	0.58	0.54	0.50	0.48	0.43	0.50	0.42
140	0.55	0.59	0.57	0.44	0.50	0.50	0.62	0.46
160	0.57	0.54	0.67	0.52	0.54	0.48	0.57	0.48
180	0.56	0.62	0.56	0.48	0.50	0.56	0.55	0.54
200	****	****	****	****	****	****	****	****
220	0.55	0.57	0.54	0.50	0.48	0.50	0.54	0.45
240	0.50	0.54	0.67	0.52	0.50	****	0.54	0.52
260	0.55	0.53	0.65	0.48	0.48	****	0.52	0.46
280	0.53	0.49	0.58	0.51	0.47	0.50	0.51	0.46
300	0.59	0.52	0.65	0.50	0.65	****	0.52	0.46
320	0.58	0.48	0.66	0.52	0.50	****	0.56	0.46
340	0.64	0.48	0.68	0.52	0.50	****	0.56	0.53
360	0.65	0.50	0.65	0.56	0.47	****	0.48	0.52
380	****	****	****	****	****	****	****	****
400	0.60	0.48	0.67	0.47	0.50	****	0.48	0.48
420	0.74	0.48	0.65	0.56	0.52	****	0.54	0.59
440	****	0.48	0.63	0.48	0.50	0.75	0.48	0.44
460	0.57	0.45	0.60	0.58	0.48	****	0.52	0.48
480	0.67	0.44	0.66	0.52	0.58	0.50	0.52	0.54
500	0.71	0.59	0.57	0.53	0.55	1.00	****	0.50
520	****	0.44	0.68	0.52	0.52	****	0.52	0.53
540	0.59	0.43	0.60	0.56	0.52	1.00	0.54	0.48
560	****	****	****	****	****	****	****	****
580	0.64	0.48	0.59	0.50	0.46	0.60	0.55	0.54
600	0.65	0.46	0.57	0.50	0.54	****	0.62	0.54
620	0.58	0.43	0.52	0.49	0.47	1.00	0.58	0.53
640	0.64	0.49	0.56	0.50	0.50	0.50	0.63	0.53
660	0.61	0.48	0.55	0.51	0.55	****	0.66	0.55
680	0.69	0.44	0.54	0.48	0.52	****	0.61	0.50
700	0.64	0.47	0.57	0.53	0.53	1.00	0.48	0.49
720	0.62	0.50	0.54	0.50	0.55	****	0.53	0.50
740	0.60	0.46	0.65	0.49	0.57	****	0.54	0.52
760	0.57	0.48	0.60	0.54	0.56	****	0.59	0.55
780	0.63	0.51	0.61	0.50	0.56	****	0.62	0.55

F300 MONKEY 130

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	56	94	76	56	86	78	44	80
40	52	95	86	44	89	82	42	77
60	44	96	43	40	96	86	100	50
80	44	87	56	30	78	8	100	59
100	48	83	60	33	72	58	98	90
120	52	77	62	40	85	63	96	100
140	44	83	64	48	81	68	90	88
160	41	89	56	46	86	68	96	91
180	52	96	60	48	77	54	90	67
200								
220	37	79	40	32	86	18	76	100
240	50	80	44	33	88	23	96	77
260	45	84	50	40	52	50	87	81
280	44	88	48	33	94	67	95	89
300	50	82	46	38	69	34	97	88
320	39	70	60	23	64	46	82	97
340	33	76	60	39	80	30	84	94
360	31	83	62	32	50	6	70	84
380								
400	88	83	52	29	64	4	92	96
420	84	78	50	42	76	9	84	96
440	93	84	33	17	32	48	83	73
460	82	90	39	26	38	20	100	85
480	73	78	36	29	36	17	93	55
500	65	87	54	21	48	13	89	17
520	62	84	48	21	58	16	79	13
540	63	81	55	17	48	0	71	46
560								
580	68	93	50	25	40	6	88	00
600	63	87	44	27	42	0	70	03
620	52	91	37	32	44	21	96	57
640	67	92	43	18	55	36	95	92
660	46	83	43	29	65	42	98	84
680	38	85	49	25	40	13	86	85
700	39	81	48	18	43	20	90	69
720	42	91	52	30	38	27	95	00
740	51	66	48	39	43	20	89	02
760	34	74	40	32	58	32	94	00
780	33	84	43	31	42	16	81	00

F300 MONKEY 130

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.67	0.81	0.70	0.88	0.68	0.75	0.77	0.70
40	0.77	0.80	0.90	0.92	0.84	0.79	0.70	0.65
60	0.83	0.83	0.77	0.80	0.69	0.91	0.89	0.92
80	0.83	0.85	0.85	0.83	0.82	1.00	0.82	0.71
100	0.73	0.87	0.92	0.85	0.91	0.79	0.80	0.67
120	0.75	0.85	0.76	0.82	0.83	0.80	0.96	0.55
140	0.83	0.80	0.78	1.00	0.73	0.73	0.84	0.57
160	0.82	0.87	0.91	0.83	0.80	0.79	0.80	0.62
180	0.85	0.85	0.83	0.85	0.71	0.79	0.80	0.67
200	****	****	****	****	****	****	****	****
220	0.80	0.85	0.82	0.88	0.68	0.75	0.68	0.67
240	0.87	0.85	0.75	0.89	0.63	0.86	0.84	0.60
260	0.78	0.83	0.89	0.93	0.86	0.81	0.88	0.84
280	0.89	0.81	0.82	0.85	0.83	0.84	0.83	0.60
300	0.83	0.87	0.91	0.90	0.89	0.80	0.88	0.59
320	0.82	0.83	0.82	1.00	0.78	0.83	0.70	0.57
340	0.89	0.84	0.82	0.91	0.88	0.75	0.76	0.62
360	0.88	0.89	0.92	0.86	0.92	1.00	0.69	0.59
380	****	****	****	****	****	****	****	****
400	0.82	0.81	0.75	0.83	0.78	1.00	0.71	0.58
420	0.81	0.81	0.83	0.91	0.75	0.67	0.88	0.56
440	0.77	0.85	0.80	1.00	0.86	1.00	0.75	0.59
460	0.73	0.58	0.71	0.86	0.78	1.00	0.89	0.57
480	0.79	0.82	0.80	0.88	1.00	0.80	0.89	0.50
500	0.76	0.87	0.87	0.80	0.85	0.87	0.72	0.60
520	0.78	0.87	0.86	1.00	0.88	1.00	0.82	0.67
540	0.82	0.82	0.81	0.75	0.92	1.00	0.71	0.54
560	****	****	****	****	****	****	****	****
580	0.76	0.82	0.82	1.00	0.92	1.00	0.59	****
600	0.86	0.70	0.92	0.83	0.89	****	0.69	1.00
620	0.82	0.87	0.86	0.92	0.85	0.86	0.80	0.63
640	0.82	0.84	0.89	0.86	0.96	0.87	0.87	0.62
660	0.85	0.86	0.94	0.91	0.84	0.87	0.57	0.69
680	0.86	0.87	0.90	0.90	0.87	1.00	0.59	0.72
700	0.88	0.85	0.84	0.86	0.89	0.90	0.58	****
720	0.86	0.87	0.92	0.83	0.87	0.83	0.83	****
740	0.86	0.87	0.83	0.88	0.89	0.91	0.81	1.00
760	0.77	0.66	0.88	0.92	0.96	0.81	0.59	****
780	0.85	0.69	0.89	0.92	0.90	0.86	0.70	****

FOOD MONKEY 410

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	100	79	96	88		84	41	27
40	76	74	93	89		93	41	00
60	100	100	100	82		64	44	04
80	92	100	100	100		83	22	00
100	85	98	98	100		94	58	00
120	84	100	93	96	90	73	13	00
140	90	93	84	92	62	68	38	00
160	93	100	100	96	96	92	00	00
180	100	100	100	90	96	76	00	30
200								
220	93	100	100	86	100	69	00	00
240	100	96	100	96	100	00	03	16
260	85	100	96	100	100	00	00	00
280	100	100	96	94	100	00	02	00
300	100	100	100	96	100	08	53	00
320	93	100	100	100	100	00	00	00
340	97	100	100	96	100	00	00	00
360	100	100	100	100	100	00	07	00
380								
400	68	100	100	100	92	00	00	00
420	100	76	100	100	100	00	00	00
440	100	100	100	100	100	43	03	00
460	83	97	100	100	100	89	00	00
480	85	100	100	100	100	88	00	00
500	52	100	100	81	100	64	08	00
520	27	100	96	96	100	82	00	00
540	25	96	96	92	100	74	37	00
560								
580	33	100	65	44	100	55	57	00
600	19	100	100	90	96	100	79	00
620	100	96	96	100	96	41	18	00
640	94	93	100	98	100	82	00	02
660	100	100	100	100	100	00	00	00
680	96	96	100	100	100	00	00	02
700	80	96	100	100	100	58	00	00
720	93	100	88	92	100	84	00	00
740	67	98	100	100	100	86	00	00
760	2	93	100	100	98	02	20	00
780	83	100	86	90	100	00	10	02

FOOD MONKEY 410

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.66	0.63	0.61	0.61	****	0.64	0.67	0.75
40	0.63	0.70	0.56	0.52	****	0.61	0.67	****
60	0.59	0.59	0.50	0.54	****	0.67	0.64	****
80	0.57	0.51	0.58	0.51	****	0.60	0.64	****
100	0.58	0.53	0.51	0.52	****	0.61	0.63	****
120	0.63	0.50	0.57	0.54	0.60	0.63	0.67	****
140	0.58	0.57	0.55	0.58	0.53	0.60	0.64	****
160	0.65	0.54	0.57	0.54	0.58	0.63	****	****
180	0.64	0.52	0.59	0.58	0.60	0.65	****	0.71
200	****	****	****	****	****	****	****	****
220	0.64	0.59	0.63	0.54	0.67	0.67	****	****
240	0.67	0.62	0.54	0.58	0.57	****	****	0.75
260	0.69	0.53	0.58	0.57	0.56	****	****	****
280	0.64	0.52	0.57	0.48	0.53	****	0.61	****
300	0.61	0.55	0.56	0.50	0.60	0.80	0.63	****
320	0.63	0.55	0.65	0.57	0.58	****	****	****
340	0.67	0.63	0.62	0.56	0.64	****	****	****
360	0.63	0.56	0.61	0.57	0.55	****	****	****
380	****	****	****	****	****	****	****	****
400	0.74	0.59	0.62	0.52	0.62	****	****	****
420	0.64	0.45	0.62	0.40	0.56	****	****	****
440	0.63	0.59	0.59	0.56	0.59	0.69	****	****
460	0.63	0.59	0.60	0.58	0.57	0.64	****	****
480	0.70	0.54	0.62	0.57	0.60	0.65	****	****
500	0.63	0.58	0.58	0.59	0.59	0.75	0.50	****
520	0.75	0.64	0.62	0.62	0.57	0.67	****	****
540	0.71	0.67	0.63	0.61	0.57	0.70	0.69	****
560	****	****	****	****	****	****	****	****
580	0.75	0.60	0.60	0.58	0.57	0.69	0.59	****
600	0.50	0.62	0.55	0.60	0.56	0.65	0.64	****
620	0.57	0.55	0.60	0.59	0.57	0.65	0.67	****
640	0.57	0.54	0.56	0.57	0.56	0.65	****	1.00
660	0.54	0.55	0.58	0.60	0.54	****	****	****
680	0.60	0.54	0.60	0.60	0.56	****	****	1.00
700	0.73	0.58	0.59	0.58	0.54	0.64	****	****
720	0.74	0.58	0.60	0.58	0.57	0.67	****	****
740	0.69	0.60	0.62	0.60	0.56	0.67	****	****
760	****	0.67	0.60	0.59	0.56	1.00	0.58	****
780	0.64	0.66	0.64	0.60	0.61	****	0.60	****

FOOD MONKEY 418

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	100	74	36	34	41	79	94	96
40	100	36	70	38	100	96	100	92
60	94	91	83	42	96	88	92	96
80	96	96	36	50	100	38	82	88
100	48	98	43	14	100	23	100	96
120	54	81	50	4	100	92	96	66
140	70	96	77	69	96	64	93	69
160	66	81	78	52	100	91	39	92
180	38	96	75	69	100	92	48	95
200								
220	28	96	40	33	58	58	46	97
240	32	97	47	38	100	72	86	73
260	73	100	76	91	100	100	93	00
280	62	98	58	8	100	100	93	42
300	44	96	64	92	100	94	96	92
320	61	96	46	13	100	88	93	89
340	58	100	47	82	100	86	78	83
360	73	100	34	16	100	72	57	70
380								
400	03	100	30	26	96	77	100	00
420	0	100	25	77	100	100	93	07
440	03	96	50	56	100	85	89	92
460	41	100	96	3	100	73	80	14
480	33	100	100	19	100	86	81	72
500	32	100	42	0	100	54	08	97
520	45	100	38	50	100	93	23	66
540	07	100	93	92	100	100	67	43
560								
580	17	33	89	26	96	88	100	41
600	39	89	96	62	96	96	100	85
620	41	93	98	0	100	89	96	98
640	51	98	100	0	100	78	96	78
660	64	91	96	0	98	05	98	93
680	57	98	83	2	100	02	100	98
700	73	96	100	0	100	00	61	04
720	86	92	100	2	98	00	00	02
740	87	95	100	4	100	00	00	00
760	75	98	100	0	98	00	48	00
780	87	98	100	0	98	00	15	00

FOOD MONKEY 418

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.48	0.57	0.64	0.64	0.58	0.48	0.41	0.48
40	0.56	0.56	0.62	0.73	0.46	0.46	0.44	0.46
60	0.66	0.50	0.75	0.64	0.50	0.55	0.46	0.44
80	0.64	0.47	0.76	0.63	0.46	0.53	0.44	0.43
100	0.64	0.47	0.58	0.75	0.47	0.43	0.39	0.44
120	0.73	0.50	0.70	1.00	0.48	0.45	0.42	0.53
140	0.67	0.44	0.75	0.65	0.44	0.50	0.50	0.51
160	0.74	0.48	0.73	0.64	0.52	0.52	0.67	0.50
180	0.82	0.50	0.72	0.72	0.44	0.56	0.54	0.52
200	****	****	****	****	****	****	****	****
220	0.71	0.48	0.70	0.78	0.56	0.50	0.64	0.50
240	0.75	0.50	0.88	0.82	0.50	0.44	0.56	0.55
260	0.73	0.50	0.74	0.59	0.42	0.50	0.49	****
280	0.71	0.48	0.79	0.60	0.43	0.50	0.47	0.55
300	0.77	0.46	0.78	0.64	0.50	0.52	0.46	0.52
320	0.76	0.54	0.85	0.67	0.48	0.49	0.60	0.48
340	0.71	0.50	0.82	0.57	0.47	0.58	0.57	0.54
360	0.68	0.50	0.80	0.80	0.50	0.57	0.58	0.52
380	****	****	****	****	****	****	****	****
400	1.00	0.50	0.88	0.75	0.47	0.50	0.63	****
420	****	0.48	1.00	0.57	0.52	0.48	0.50	1.00
440	1.00	0.54	0.62	0.61	0.52	0.48	0.54	0.64
460	0.73	0.44	0.63	1.00	0.38	0.53	0.60	0.75
480	0.78	0.52	0.62	0.60	0.50	0.48	0.62	0.67
500	0.78	0.46	0.61	****	0.42	0.54	0.50	0.55
520	0.80	0.53	0.64	0.71	0.43	0.48	0.57	0.58
540	1.00	0.55	0.68	0.72	0.43	0.56	0.65	0.58
560	****	****	****	****	****	****	****	****
580	1.00	0.70	0.64	0.75	0.41	0.50	0.53	0.62
600	0.78	0.58	0.69	0.65	0.46	0.50	0.53	0.59
620	0.37	0.52	0.60	****	0.44	0.41	0.56	0.44
640	0.78	0.55	0.62	****	0.45	0.47	0.57	0.53
660	0.80	0.58	0.60	****	0.47	0.67	0.57	0.53
680	0.74	0.55	0.65	1.00	0.46	1.00	0.56	0.57
700	0.76	0.56	0.61	****	0.45	****	0.55	0.50
720	0.79	0.62	0.61	1.00	0.51	****	****	****
740	0.69	0.60	0.61	1.00	0.48	****	****	****
760	0.74	0.57	0.57	****	0.47	****	0.63	****
780	0.75	0.60	0.57	****	0.51	****	0.63	****

FOOD MONKEY 424

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	85	93	44	0	90	80	80	100
40	97		79	17	96	100	81	64
60	94		97	43	93	90	76	100
80	98		93	91	100	43	96	100
100	96		98	98	98	100	98	98
120	100	91	96	95	93	87	100	97
140	88	81	41	42	93	86	96	74
160	88	75	41	23	100	90	94	93
180	78	100	37	71	100	70	79	79
200								
220	85	90	94	93	75	87	94	61
240	96	93	96	97	87	59	77	93
260	95	100	100	100	98	60	98	68
280	98	97	91	92	100	25	98	80
300	93	100	87	79	86	26	72	90
320	100	93	79	93	100	10	55	92
340	100	100	90	90	83	0	93	90
360	89	100	60	97	97	0	93	97
380								
400	92	100	88	97	93	7	96	97
420	97	63	100	56	100	71	82	90
440	100	93	89	70	96	93	52	95
460	97	100	64	100	82	77	67	93
480	100	100	84	56	90	97	79	100
500	89	93	76	71	93	16	53	93
520	100	93	76	73	97	82	65	97
540	88	83	63	96	88	91	78	79
560								
580	84	97	86	83	79	86	100	76
600	97	100	100	100	95	84	85	100
620	92	98	94	100	91	85	94	98
640	98	98	98	100	100	96	98	100
660	90	98	100	96	98	84	85	91
680	95	82	49	77	75	95	91	93
700	89	98	67	78	76	55	95	98
720	92	100	91	89	80	2	88	90
740	98	98	77	78	94	9	92	97
760	94	89	49	88	98	0	93	97
780	90	93	74	85	59	42	95	94

FOOD MONKEY 424

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.61	0.73	0.73	****	0.67	0.62	0.70	0.62
40	0.67	****	0.78	0.80	0.56	0.57	0.62	0.64
60	0.69	****	0.72	0.75	0.61	0.56	0.59	0.65
80	0.69	****	0.71	0.72	0.57	0.68	0.57	0.53
100	0.45	****	0.67	0.67	0.58	0.56	0.56	0.65
120	0.67	0.76	0.68	0.70	0.58	0.65	0.63	0.59
140	0.59	0.77	0.75	0.73	0.65	0.67	0.55	0.59
160	0.65	0.75	0.67	0.83	0.57	0.64	0.62	0.67
180	0.61	0.70	0.73	0.75	0.64	0.63	0.68	0.65
200	****	****	****	****	****	****	****	****
220	0.68	0.73	0.73	0.74	0.67	0.70	0.60	0.68
240	0.68	0.65	0.70	0.71	0.59	0.71	0.70	0.64
260	0.73	0.62	0.67	0.68	0.60	0.79	0.61	0.63
280	0.70	0.65	0.65	0.67	0.56	0.71	0.56	0.67
300	0.69	0.62	0.61	0.65	0.63	0.86	0.57	0.58
320	0.62	0.68	0.78	0.64	0.60	1.00	0.63	0.58
340	0.69	0.68	0.75	0.67	0.63	****	0.59	0.59
360	0.60	0.67	0.80	0.61	0.61	****	0.60	0.61
380	****	****	****	****	****	****	****	****
400	0.70	0.65	0.70	0.68	0.73	0.50	0.58	0.60
420	0.64	0.71	0.68	0.73	0.61	0.85	0.57	0.62
440	0.66	0.67	0.64	0.76	0.63	0.69	0.60	0.62
460	0.65	0.63	0.78	0.66	0.61	0.74	0.65	0.64
480	0.69	0.61	0.69	0.65	0.67	0.69	0.64	0.62
500	0.72	0.73	0.68	0.65	0.61	0.60	0.69	0.63
520	0.70	0.68	0.68	0.64	0.69	0.65	0.71	0.63
540	0.76	0.74	0.71	0.66	0.61	0.60	0.62	0.74
560	****	****	****	****	****	****	****	****
580	0.70	0.68	0.72	0.60	0.68	0.60	0.59	0.68
600	0.68	0.70	0.72	0.60	0.72	0.62	0.64	0.64
620	0.63	0.66	0.71	0.62	0.63	0.65	0.61	0.55
640	0.69	0.72	0.64	0.56	0.61	0.56	0.63	0.59
660	0.66	0.71	0.74	0.68	0.62	0.73	0.61	0.63
680	0.65	0.76	0.78	0.70	0.63	0.52	0.67	0.73
700	0.66	0.70	0.77	0.72	0.61	0.79	0.60	0.69
720	0.68	0.70	0.76	0.67	0.67	1.00	0.63	0.67
740	0.72	0.73	0.71	0.70	0.68	0.80	0.67	0.65
760	0.70	0.69	0.75	0.74	0.69	****	0.70	0.66
780	0.76	0.72	0.72	0.76	0.71	0.75	0.66	0.66

FOOD MONKEY 460

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0	53	71	93	94	88	34	31
40	0	15	90	100	80	89	8	16
60	0	21	97	100	72	93	8	
80	0	69	100	98	88	84	49	19
100	28	36	100	97	90	96	80	0
120	32	0	86	93	93	96	44	00
140	34	33	90	90	74	69	85	14
160	45	85	76	83	73	73	87	08
180	48	43	76	96	44	69	75	31
200								
220	48	3	86	84	70	88	89	46
240	19	24	55	100	94	41	79	38
260	0	64	24	96	96	76	89	00
280	25	9	0	97	98	34	98	28
300	86	0	6	96	52	10	74	07
320	63	21	16	44	71	0	88	00
340	46	5	0	92	97	4	86	00
360	0	0	38	88	89	10	90	07
380								
400	0	66	14	100	96	4	85	03
420	0	40	3	100	93	0	97	00
440	27	21	20	100	97	7	64	00
460	0		19	96	81	7	72	00
480	0		0	64	83	0	84	00
500	0		11	48	90	0	73	04
520	0		11	60	100	17	48	00
540	69		12	55	93	3	59	04
560								
580	0	21	29	55	89	55	93	0
600	0	100	3	69	79	63	79	0
620	73	96	12	84	98	79	73	0
640	42	93	0	93	100	77	98	0
660	53	46	2	71	96	79	90	2
680	92		2	86	96	38	97	0
700	79	0	2	38	98	54	93	0
720	7	24	2	42	93	6	96	40
740	73	3	4	24	98	66	90	2
760	100	2	0	30	93	57	93	0
780	89	12	4	0	70	37	94	0

FOOD MONKEY 460

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	****	0.63	0.50	0.64	0.67	0.71	0.80	0.80
40	****	0.50	0.54	0.61	0.71	0.72	****	0.60
60	****	0.80	0.52	0.59	0.72	0.65	****	****
80	****	0.66	0.54	0.61	0.72	0.69	0.79	0.80
100	0.60	0.57	0.55	0.59	0.73	0.63	0.78	****
120	0.75	****	0.58	0.56	0.74	0.62	0.82	****
140	0.80	0.67	0.58	0.61	0.80	0.70	0.73	0.75
160	0.69	0.53	0.64	0.63	0.74	0.64	0.70	0.50
180	0.64	0.53	0.50	0.60	0.75	0.75	0.72	0.75
200	****	****	****	****	****	****	****	****
220	0.80	****	0.56	0.62	0.86	0.73	0.72	0.75
240	0.80	0.57	0.67	0.67	0.66	0.75	0.70	0.73
260	****	0.60	0.58	0.57	0.68	0.71	0.69	****
280	0.85	0.60	****	0.63	0.64	0.68	0.60	0.75
300	0.96	****	0.50	0.63	0.69	1.00	0.70	1.00
320	0.74	0.67	0.80	0.83	0.76	****	0.65	****
340	0.83	****	****	0.63	0.64	1.00	0.50	****
360	****	****	0.50	0.64	0.56	0.67	0.67	0.50
380	****	****	****	****	****	****	****	****
400	****	0.63	0.75	0.59	0.74	1.00	0.78	1.00
420	****	0.75	1.00	0.64	0.68	****	0.62	****
440	0.63	0.60	0.50	0.85	0.72	1.00	0.78	****
460	****	****	0.50	0.75	0.73	0.50	0.72	****
480	****	****	****	0.72	0.71	****	0.71	****
500	****	****	0.67	0.67	0.81	****	0.73	1.00
520	****	****	0.67	0.73	0.76	0.80	0.73	****
540	0.65	****	0.67	0.69	0.77	****	0.71	****
560	****	****	****	****	****	****	****	****
580	****	0.67	0.67	0.75	0.72	0.81	0.71	****
600	****	0.58	****	0.73	0.61	0.78	0.68	****
620	0.58	0.56	0.57	0.65	0.67	0.76	0.74	****
640	0.54	0.61	****	0.71	0.66	0.76	0.64	****
660	0.69	0.58	1.00	0.72	0.64	0.76	0.62	1.00
680	0.62	****	1.00	0.73	0.84	0.73	0.60	****
700	0.63	****	****	0.76	0.67	0.72	0.62	****
720	0.75	0.57	1.00	0.75	0.67	1.00	0.61	0.70
740	0.60	0.50	1.00	0.79	0.62	0.73	0.60	****
760	0.63	****	****	0.76	0.64	0.73	0.64	****
780	0.59	0.50	1.00	****	0.74	0.68	0.67	****

FOOD MONKEY 540

20 MINUTE PERFORMANCE SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	23	17	52	14	32	31	0	3
40	14	7	88	17	89	87	4	7
60	4	3	100	7	92	95	32	0
80	38	12	100	10	100	22	92	0
100	74	13	90	4	100	88	100	0
120	56	4	100	10	100	92	83	0
140	36	18	100	10	97	69	96	0
160	78	13	96	21	100	92	92	0
180	77	14	96	8	85	70	100	0
200								
220	28	27	96	15	89	88	92	0
240	94	21	100	21	100	24	93	0
260	79	27	100	19	98	14	88	0
280	86	27	98	22	100	2	2	0
300	59	30	100	35	100	0	0	0
320	78	13	96	50	100	0	0	0
340	38	7	93	39	96	0	14	0
360	14	22	95	68	97	4	14	0
380								
400	0	0	96	40	83	0	21	0
420	22	14	100	63	93	0	16	0
440	39	7	96	89	94	0	19	0
460	33	3	92	96	96	0	11	0
480	26	0	19	78	100	0	0	0
500	21	0		69	88	13	0	0
520	33	4	50	33	70	0	0	0
540	31	0	53	4	86	0	14	0
560								
580	65	7	3	7	70	0	29	0
600	90	17	23	4	97	4	37	0
620	89	2	82	23	95	0	20	0
640	95	0	90	4	95	4	82	0
660	95	0	96	0	98	0	93	0
680	73	0	98	0	98	0	94	0
700	91	0	100	3	93	0	96	0
720	86	0	98	44	100	0	100	0
740	91	0	85	59	98	0	72	0
760	36	0	21	79	97	0	2	0
780	0	0	100	12	98	2	0	0

FOOD MONKEY 540

20 MINUTE REACTION SCORES

TIME	B1	B2	B3	B4	B5	E	P1	P2
20	0.67	1.00	0.75	0.67	0.86	0.56	****	1.00
40	0.75	1.00	0.59	0.60	0.67	0.65	1.00	0.50
60	1.00	****	0.54	1.00	0.63	0.53	0.75	****
80	0.83	0.86	0.48	0.60	0.55	0.55	0.62	****
100	0.74	0.86	0.53	1.00	0.53	0.47	0.56	****
120	0.71	1.00	0.48	0.67	0.56	0.50	0.63	****
140	0.67	0.80	0.55	1.00	0.64	0.56	0.61	****
160	0.78	0.80	0.60	0.83	0.61	0.50	0.59	****
180	0.63	0.75	0.58	1.00	0.64	0.57	0.58	****
200	****	****	****	****	****	****	****	****
220	0.78	0.88	0.71	1.00	0.63	0.55	0.59	****
240	0.67	0.93	0.54	0.67	0.62	0.57	0.58	****
260	0.67	0.75	0.50	0.78	0.56	0.63	0.52	****
280	0.68	0.80	0.57	0.82	0.51	1.00	1.00	****
300	0.77	1.00	0.58	0.78	0.62	****	****	****
320	0.71	1.00	0.63	0.80	0.63	****	****	****
340	0.73	1.00	0.62	0.82	0.58	****	0.75	****
360	0.75	0.60	0.65	0.65	0.61	****	0.75	****
380	****	****	****	****	****	****	****	****
400	****	****	0.52	0.88	0.68	****	0.83	****
420	0.83	1.00	0.63	0.65	0.60	****	1.00	****
440	0.78	0.50	0.60	0.56	0.66	****	0.80	****
460	0.88	1.00	0.50	0.65	0.69	****	1.00	****
480	0.75	****	1.00	0.62	0.62	****	****	****
500	0.83	****	****	0.67	0.70	0.75	****	****
520	0.80	1.00	0.77	0.63	0.71	****	****	****
540	0.88	****	0.81	1.00	0.72	****	0.75	****
560	****	****	****	****	****	****	****	****
580	0.76	1.00	1.00	1.00	0.69	****	0.75	****
600	0.67	0.80	0.80	1.00	0.59	****	0.73	****
620	0.72	****	0.79	0.85	0.63	****	0.90	****
640	0.67	****	0.66	1.00	0.62	0.50	0.69	****
660	0.63	****	0.63	****	0.55	****	0.61	****
680	0.72	****	0.67	****	0.55	****	0.79	****
700	0.65	****	0.63	1.00	0.59	****	0.64	****
720	0.67	****	0.66	0.70	0.57	****	0.62	****
740	0.67	****	0.66	0.70	0.55	****	0.67	****
760	0.72	****	0.83	0.63	0.55	****	1.00	****
780	****	****	0.64	0.67	0.60	1.00	****	****